

TECHNICAL WRITING

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BY

T. A. RICKARD



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TO
GEORGE McLANE WOOD
EDITOR
UNITED STATES GEOLOGICAL SURVEY

IN APPRECIATION OF HIS SERVICES AS
AN EXEMPLAR AND TEACHER OF
GOOD TECHNICAL WRITING

PREFACE TO THE SECOND EDITION

THE demand for this book has warranted the publishers in asking me to prepare a second edition, and in doing so I have taken the opportunity of making many corrections and additions. The first two chapters and the last two have undergone little change, but the others have been re-written. I have added a discussion of the subjunctive and of 'shall and will'. The chapter entitled 'The Wrong Word' is new; so is that on punctuation.

To those who care for the proper use of our language the apparent awakening of interest in the matter is encouraging. The engineering profession as a whole is showing more regard for one of its instruments of precision, and the general public is becoming aware of the importance of correct speech, as is indicated by the observance of special days and weeks during which the people of a given community agree to devote particular attention to the improvement of their methods of expression. It is noteworthy that most American schools of engineering now maintain a course in English, and many of them have special classes in the subject. The universities are compelling their students to cultivate a higher standard of writing in examination papers, so that the proof of knowledge must be joined with the ability to convey that knowledge in proper style. Even the mining schools have awakened to their duty in this matter. It may be said that it is no part of their function to teach English, which should have been taught to the student in the high-school. The answer is that we face a condition, not a theory; if the student lacks skill in a matter

so important as the use of his language, it is only fair and wise to give him the necessary training before it is too late.

It has pleased me greatly to be told that my little book has helped the younger members of my former profession to write better. As an editor I have been cognizant of many instances of improvement on the part of contributors, because their eyes have been opened to the need for intelligence and care in writing. As I said in the preface to the first edition, my hope is to make evident the good results that come from taking pains in the use of language. That hope has been justified.

Again I am indebted to the friends that have read and criticized my manuscript. I tender special thanks to my two former editorial associates, Messrs. Arthur W. Allen and Arthur B. Parsons; also to Mr. P. B. McDonald, another former associate and now Assistant Professor of English in New York University; and again to Mr. Grant H. Smith and Mr. C. Irving Wright, both of them lawyers with a fine feeling for English; and to Mr. Cornelius B. Bradley, Professor Emeritus of English in the University of California, who has helped me greatly by reading the proofs.

T. A. RICKARD.

SAN FRANCISCO,
March 23, 1923.

PREFACE TO THE FIRST EDITION

THIS little book has grown from a set of five lectures delivered before the engineering classes of the University of California in 1916. The text has been revised and expanded for the purpose of publication. It is a ticklish task to write on writing, because the effort provokes self-consciousness. Errors there will be, inevitably. The reader is welcome to the pleasure he may feel in detecting them, for the keenness of his criticism will be the measure of his interest in what he is reading. All I hope to accomplish by means of these printed lectures is to cause the members of my former profession "to sit up and take notice". Whether my criticisms prove unacceptable or my suggestions unwelcome does not matter if the effect is to make the reader, as a writer, careful where before he was careless. The inculcation of rules and precepts is of small consequence compared with the awakening of interest in the proper use of language. If an intelligent man can be made to realize the importance of taking pains in writing, the rest is easy; self-criticism is the beginning of knowledge. Should this book succeed in arousing sympathetic interest in the important matter of literary expression, it will have served its purpose. As a revised edition is anticipated, I ask my readers to inform me of any errors they detect and to favor me with any criticisms they may care to offer, so that together we may labor in the cause of literary workmanship. The text has been read by several friends, to whom I am indebted for criticisms and suggestions. I desire to record my thanks to them, namely, Mr. George M. Wood, editor to the U. S. Geological Survey, Mr. Cornelius B. Bradley, Professor Emeri-

tus of English in the University of California, Mr. Courtenay De Kalb, Mr. Grant H. Smith, and Mr. C. Irving Wright.

T. A. RICKARD.

SAN FRANCISCO,

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TECHNICAL WRITING

I. GENERAL PRINCIPLES

It has been stated, by Sir James M. Barrie, that "the man of science appears to be the only man who has something to say, just now—and the only man who does not know how to say it". The friendly jibe of the novelist contains enough exaggeration to make it humorous to the followers of Huxley and Spencer; but could any litterateur poke similar fun at the exponents of the avowedly utilitarian branches of science—the men of technology—without suggesting an unpleasant truth?

Indeed the engineer does bungle language deplorably. He makes a fetish of efficiency, yet he shows no regard for the effective use of one of his most important tools—the pen; he believes devoutly in accuracy, yet he employs an instrument of precision as carelessly as a small boy handles a gun. This inconsistency may be due to causes such as were indicated by the Academic Senate when it undertook to explain the defective writing of the students in this university.* The Senate suggested that the student is "constantly subjected by his environment to the unedifying influence of myriad examples of poor English", and that he is also affected by "a certain public prejudice against correctness of expression". With this opinion most of us will agree. Our local newspapers, for instance, tend to spoil the student's taste for good English; later in life, as an engineer, his daily contact with illiterate men inclines him to careless speech and slovenly writing. As

* The University of California, where these lectures were delivered.

Brander Matthews says: "The uneducated are inclined to resent any speech more polished than their own".

A distinguished engineer and veteran manager of mines, Arthur D. Foote, recently complained to me about the careless writing of the young men that applied to him, by letter, for professional employment. Most of these letters, he asserted, were so untidy in appearance and so turgid in expression that he threw them into the waste-paper basket; but, he added, whenever he received a letter neatly written and clearly expressed he gave it kindly consideration. He told me also that he had been unable to promote several bright young fellows on his staff because they did not know how to keep a legible record or how to use English intelligibly. "Such bad English; drummer's English!" he exclaimed. In the course of further conversation he recalled an interview with the late Professor Christy, of this university, who asked him to give an address to the mining students. "No", Mr. Foote replied, "the engineer is called upon to do everything but preach; from that he is excused." Christy then asked: "If you were to give a talk, what would be your subject?" Foote replied: "Writing; your students need to be taught that. I would not allow any of them to disfigure our mine-records". "But that", pleaded Christy, "is the business of the high-school." "They appear to shirk it", said Foote, "you ought to see that they don't get through the mining-school without some training in the writing of reports and technical papers."

The engineer graduates of this university are not peculiar in being unable to handle skilfully a tool that they must use as long as they live. In this respect many graduates of other technical colleges are equally deficient. A. S. Hill,* Professor of Rhetoric in Harvard University, has said: "Every year Harvard sends out men—some of them high scholars—whose manuscripts would disgrace a boy of twelve; and yet the College can hardly be blamed, for she cannot be expected to conduct an infant-school for adults". The cure is for engineering

* Whose 'Principles of Rhetoric' is a most useful textbook.

colleges to refuse degrees to students that show no regard for precision of language, meanwhile making an effort to remedy the defect by giving the necessary instruction.

There should be no need to lay stress upon the part that writing plays in an engineer's life. Until he accomplishes some notable work he is known to most other men only through his writings, in the form of letters, articles, and reports. In default of personal acquaintance, a man—particularly a young man with his reputation to make—is likely to be judged by his business letters. From the style of these, his correspondents infer the quality of his mind and the order of his method. The ability to write a terse report, to state facts plainly, and to convey information intelligibly wins instant respect for him, and opens the door to wider opportunity. Similarly, an article contributed by an engineer to a technical periodical may mark him as well-informed, careful in observation, and accurate in statement. An agreeable and capable writer makes friends—even clients—of his readers. To be known honorably is capital.

In my own experience I have found that nicety of phrasing is regarded by many engineers as effeminate. Several of those whose writings I have revised would applaud the statement of a Denver editor that literary form is "a mere frill"; all that is needed, said he, is "to get there", to say what you have to say in your own way, no matter how imperfectly, so long as you say it. This goes to the heart of the matter. You may, of course, make yourself intelligible even if you disregard many of the principles of the art—for writing is an art; but this lecture was not intended for those who are satisfied with such a performance. Although you may make yourself understood in some measure by following such a method—or lack of method—you cannot convey your ideas clearly, and fine distinctions of meaning will elude you completely. Furthermore, such writing will stamp you as uncultured or careless, and therefore not equipped for scientific work. The aim of all of us—not the Denver editor alone—is "to get there", that is,

to accomplish our purpose. "For", as Hamlet says, "every man has business and desire, such as it is." What then is the purpose of writing? It is to convey ideas: to tell what we have seen, what we think, what we believe. Language is a vehicle of expression; it is not intended for soliloquy; civilized man does not live by himself; nor does he talk to himself, except when drunk.

Assuming therefore that the purpose of writing is to convey ideas, and that ideas can not be conveyed successfully in defiance of technique, let us consider how to acquire the art of expression. No one can attain proficiency without care and without method, least of all when he is discussing technology or explaining matters that require mental alertness on the part of both the persons concerned, the writer and the reader. At best human speech is an inadequate vehicle of thought; much of the idea is lost in transit; the part that reaches its destination is travel-worn. Rarely does a thought impinge upon the reader's mind with the freshness and the vigor with which it issued from the brain of the writer. To expect to succeed without effort is childish, because it is contrary to experience. It is as if a farmer, going to market, were to put his potatoes, not into sacks, but loosely into a wagon that needed repair, and then, taking any road that offered, were to drive without regard to ruts or stones, rapidly and recklessly, just to get there. The result would be that many of his potatoes would be thrown out of the wagon, and those that survived the journey would be so bruised as to be unfit for sale. Another farmer, with more sense, puts his potatoes into sacks, which are packed securely in a tight wagon, with axles well oiled and the brake in good order. He selects the road that leads as directly as possible to his destination, he drives carefully and avoids obstacles, so as to deliver his potatoes speedily and safely at the nearest market, where they promptly fulfil his purpose. He 'gets there' in the full meaning of the phrase; the other fellow fails. Henry James, in an address at Bryn Mawr, said: "There are in every quarter, in our social order, impunities of aggression

and corruption in plenty; but there are none, I think, showing so unperturbed a face—wearing, I should slangily say, if slang were permitted me here, so impudent a ‘mug’—as the forces assembled to make you believe that no form of speech is provably better than another, and that just this matter of ‘care’ is an affront to the majesty of sovereign ignorance”.

The Denver editor who considered literary form “a mere frill”, and expected “to get there” by writing in his own undisciplined way, might be forgiven for claiming that some of his notions were approved in such a book as Lounsbury’s ‘The Standard of Usage in English’. The Yale professor argues that the standard of speech is the usage of the cultivated; that correctness is determined by the practice and consent of the great authors; in short, that the best usage is the usage of the best writers. To him the grammarian, the purist, the pedant are all anathema. “The mere opinions of individuals, no matter how eminent”, he says, “will never carry much weight with the users of speech.” Why then waste time in writing on the subject? If a great writer has used words in a manner contrary to the dictum of a grammarian, then it is the grammarian who has erred in his dictum, not the great writer in his practice. That is his argument. But, I venture to ask, what is grammar but the crystallization of accepted convention, the precise recognition of the best usage, a system of rules based upon the literary habits of great writers? The best usage is not the usage of the best writers, but the best usage of the best writers. Even the best of them make slips and fall occasionally into a bad habit. No writer is impeccable. Those who prepare grammars and other textbooks on the art of writing base their generalizations on the practice of the best writers when at their best, and that is why in the main such books are trustworthy guides. If I were to say to an engineering student: “Don’t bother about textbooks in English; ignore the grammarians; just imitate the best writers”, I should be giving a counsel of imperfection that would stultify itself. On the contrary, I say: “Take note of the rules of grammar, which state

the functions and relations of the parts of speech; read the textbooks, which summarize the methods that have been found expedient for good writing; make yourself familiar with the great writers, who illustrate the correct application of these teachings; and then develop your own critical faculty so that you may hold fast to that which is good”.

Before proceeding further I think it proper to say that I speak to you as an elder brother. Like some of you, I was trained to be a mining engineer; I practised my profession for 18 years, until I began to earn my living as an editor, 15 years ago;* it is as a technical writer that I address you, as one in sympathy with your profession and keenly aware of the importance of being able to write well. I have long been learning, and I am still learning by the application of the ideas and methods that I offer now for your guidance. I speak to you as a student, not as a master; as an amateur who has become a professional, not as a professor.

Having practised the art of writing for an essentially practical purpose, I understand the difficulty of it, and also the delight of doing it well occasionally. In my daily work as an editor, revising manuscript, I am astonished often to see how illiterate the scientific man can be, and how little of university culture clings to the engineer. For instance, he will commonly use the word ‘data’ as if it were of the singular number.

The data is [are] plentiful.†

Much [many] data **is** [are] available.

It was not possible to obtain a value for WO_3 in scheelite from so little [few] data.

There will be less [fewer] data from which to make an estimate.

An officer of the U. S. Geological Survey says:

No data is [are] available concerning the supply of such material.

* This was said in 1916.

† In the examples quoted for the purpose of illustration, the words that should be omitted or to which critical attention is called will be printed in bold-faced type, and the words to be substituted will be placed between brackets.

A physicist of the U. S. Bureau of Mines says:

Data pertaining to these condensers is [are] assembled in Table III.

A State Mineralogist writes:

The data was [were] obtained by making personal investigations.

A similar blunder is made with 'phenomenon'. A technical journal remarks:

Sir Oliver Lodge re-discovered the same phenomena and suggested its [their] application to purifying the atmosphere.

It would be better to say, "and suggested that they be applied to the purification of the atmosphere".

An Assistant Principal of a School of Metallurgy writes:

Later I discovered this same phenomena in other kinds of glass.

The plural form might have been considered a typist's error, if perpetrated once, but he wrote again:

He gives the causes of this phenomena.

This might be only an unhappy coincidence, but when he says a third time, "The fact that this phenomena occurs", I know that the poor fellow is the victim of a dreadful habit.

Chemists have yet to agree upon the explanation of much [many] of the phenomena to be observed.

The use of rods, instead of balls, as a grinding media . . .

Perhaps, as Landor suggested, we ought to Anglicize such Latin or Greek words and write datums, stratums, phenomenons, as we write mediums, factotums, and ultimatums, without apologizing. Indeed one thoroughly capable metallurgist objected to an editorial correction of this common solecism. If a university graduate does not know that 'data' is the plural of 'datum', he is no better informed than the miner who speaks of "them quartz" or of "stratas that prospect". An engineer wrote to me about the "foliae" of the schist in Rhodesia. The plural of *folium*, of course, is *folia*. Those who make such blunders also write about the "ration" of 10 : 1 and the "Seward peninsular".

You may say that these blunders arise from ignorance of Latin, but this is not the whole truth; they come from ignoring good usage, and from reading an illiterate daily press. The editor of the San Francisco 'Chronicle' writes:

Armed with this data, the U-boats have crossed the Atlantic to find a more fruitful field for their operations.

The editor of the 'Examiner' says:

Data is being gathered on intensive farming.

A writer for the U. S. Bureau of Mines evidently had an inkling that things were wrong, so he compromised:

Since this data were collected.

It may not be necessary to be a classical scholar in order to write good English—such as John Bright spoke—but I believe it true that some knowledge of Latin and Greek is necessary to an intimate understanding of English, particularly that part of it which deals with technical science, the terms of which are derived mainly from the classical languages. Most of our Anglo-Saxon words have been so long used to describe the every-day affairs of life and to convey simple ideas that they carry connotations unfitting them to express the new concepts of science and the precise ideas of technology. Our civilization came from the Mediterranean; our literature came through Bede, not Beowulf; through the songs of Provence, not the sagas of Schleswig. I submit to you that the Anglo-Saxon tradition has been over-done; the renaissance of learning began in Italy and its voice was Latin.* It speaks in the two classics of English literature: the King James version of the Bible and the plays of Shakespeare. Nearly two-thirds of the words in the English language are of Latin derivation. I do not refer to colloquial language, but to literature. The idea that the purity and simplicity of our literature depend upon the use of words of Anglo-Saxon origin is based upon a fallacy. In the foregoing

* 'The Art of Writing', by Sir Arthur Quiller-Couch. Lectures VIII and IX.

sentence "word" is Anglo-Saxon, "idea" is Greek, but "purity", "simplicity", "literature", "depend", "use", "origin", "based", and "fallacy" are all from the Latin. These are the principal words; the grammatical links, of course, are Anglo-Saxon, which is the matrix of English.

Since the advancement of science in the Victorian period, the vocabulary of technology has grown rapidly, borrowing words from the languages of ancient learning, so that now a scientific man can hardly speak or write intelligently without knowing the derivation of the terms he is compelled to employ. Do not use words unless you know their meaning. If your classics were skimmed at school, study the dictionary;* above all, read the best writings. "Imitation is the sincerest flattery." There is a good deal of what Marion Crawford called "the everlasting monkey" in man. That reminds me of Stevenson's phrase, "sedulous aping". He recommended the imitation of good writers for the sake of acquiring style, and described how he himself learned to write, while a student at Edinburgh, by imitating passages from Macaulay for a month, then copying Froude for another month, then Carlyle, and so on; thereby attaining the felicity of expression for which he became famous. But, be it noted, Stevenson did this for practice only; it did not prevent him from acquiring a style all his own, because he did not subject himself intellectually to another writer by setting him up as an idol.

If so many of our young engineers write uncouthly, it is because they read so little good literature. The time given to the piffle of the press is lamentable. Our grandfathers used to read the Bible daily; we read the daily newspaper. Even the magazines rarely furnish safe models of writing, and the ordinary textbook is but the dry bones of a great art. If you would absorb style subconsciously read Huxley's essays and Froude's short studies; read Ruskin and Stevenson; read Defoe's 'Robinson Crusoe' again, and Darwin's 'Voyage of

* 'The Concise Oxford Dictionary' or 'Webster's Collegiate Dictionary' can be recommended. Both are of convenient size.

the *Beagle*'; read Washington Irving's '*Alhambra*' and John Muir's '*Climbing the Sierras*'; but in order to appreciate such books, and learn from them, you must read intensively—the kind of reading that learns its lesson when done once, and once only.

Of style it is too soon to speak, "yet the man of science ought best to know that style and matter can no more be dissociated than skin and bone. In scientific prose words should be used as carefully as symbols in mathematics".* Our aim is to be understood. The art of writing is based on scientific method. Science is organized common-sense. A blunder—made not infrequently even by scientific men—is to assume that good writing is extrinsic to its subject. On the contrary, "science and literature are not two things, but two sides of the same thing". Huxley said that; and he illustrated his own maxim, so that his writings became glimpses of the obvious and his lectures opened windows into the infinite. Science, I repeat, is not divorced from literature, and no valid reason exists why technology should be regarded as if it were legally separated from good English. Technical writing is the precise expression of special knowledge. The information of the average man is like a turbid solution, the technology of an engineer is like a clean precipitate; the one is amorphous, the other crystalline.

"The development of the mind is an advance from the indefinite to the definite." The technical man in his processes, whether of the mine and mill, or in the reducing operations of his own mind, follows a similar line of action. His constant effort is to distinguish between what he knows and what he thinks he knows, between fact and fancy, between observation at first-hand and information at second-hand. When he begins to place himself on record, he should follow the same mental process, but with a difference: in his technical operations he deals with insentient matter; in his technical writing he must keep in mind the human element; for he is recording

* Sir Clifford Allbutt, whose '*Notes on the Composition of Scientific Papers*' can be recommended to the technical student.

himself not in the sand of the sea-shore, but on paper to be read by his fellows. Thus I come to a fundamental rule: REMEMBER THE READER. The Denver editor, who was contemptuous of the effort to write well, ignored this rule. Spencer, who studied style as an adjunct to philosophy, said: "The good instructor is one in whom nature or discipline has produced what we may call intellectual sympathy—such an insight into another's mental state as is needed rightly to adjust the sequence of ideas to be communicated". If you wish to communicate ideas, you must think of the other fellow, of the man at the other end of the line of mental communication represented by your writing. Thus, in order to be effective, you must be sympathetic; you will spare the reader doubt as to the meaning of what you have written, perplexity caused by the turgidity of your style, annoyance at the queerness of your terms, and weariness due to your verbosity. You will communicate what you have to say in language involving the least trouble to the reader. Some trouble he himself must take; for he also must be sympathetic and willing to expend his brain-tissue. Avoid trespassing on his patience. "Those are the most effective modes of expression which absorb the smallest amount of the recipient's attention in interpreting the symbols of thought, leaving the greatest amount for the thought itself." So said Spencer. This is the first great principle of writing: economy of mental effort on the part of the reader. Put yourself in his place, I repeat; if you do so sincerely, you will avoid most of the errors that prevent language from becoming an effective medium for the transmission of thought.

I spoke just now of economizing the mental effort of the reader; this the writer can achieve only by being willing to take pains. If you read a technical article, for example, and find that you understand it easily and comfortably, obtaining useful information without undue mental fatigue, you may rest assured that somebody else has taken trouble over the article and thereby has spared you the labor of probing the writing to discover its meaning. Either the author has made a

successful effort to be perspicuous or the editor has corrected and revised the manuscript so as to make the rough places smooth. Somebody must put hard work into every technical article that is written for publication; if not the author, then the editor; if both the author and the editor shirk their duty, the reader will have a headache. Therefore, REMEMBER THE READER. As Allbutt says: "A writer who writes to convince and not merely to see his name in print must learn to lay his mind alongside that of his reader".

The next desirable thing is to have a reader worthy of respect, so as to stimulate you to conscientious effort. Most of the letters, reports, or articles that the engineer is called upon to write are addressed to persons whom he respects. I assume therefore that you are writing to somebody or to some group of persons to whom you wish to convey technical information or scientific opinions effectively and pleasantly. To accomplish this purpose your writing must be natural, clear, precise, and convincing.

II. NATURALNESS

The key-note of good writing, as of good manners, is *B natural*. Sincerity is the first requisite for effective writing. When a man says what he knows or believes, he is likely to be interesting, because each human being possesses an individuality, a point of view, or a range of sympathy that makes him different from his fellows. To say or to write what you do not think, for the mere sake of talking or writing, is a verbal exercise that must be performed with extraordinary skill if it is to be attractive. Affectations are rarely attractive, rarely effective. To be natural is to be yourself, not a *poseur*; to give the reader the best of yourself, instead of re-warming the baked meats of yesterday. Quotations—which are second-hand thoughts—will serve occasionally when the thing you want to say has been said so well by another that it would be waste of energy to try to say it better; but, as a rule, the utterance of the writer himself is more interesting than the quotation, because the writer brings something of himself to bear on the subject, and for the moment is more in touch with the reader than any dear departed author. Therefore, say things as best you can in your own way, neither in borrowed words nor in the phraseology that mimics another. Write as if you were speaking to a person whom you desire to persuade or convince. You will then write better than you speak, because, in the first place, you can be more deliberate, and, secondly, you can revise what you have written.

Speaking and writing are similar mental acts, with a difference: the difference between eating food raw and eating it cooked. Some kinds of food gain nothing by being cooked; likewise some kinds of utterance are not bettered by being written down first; but most expressions of thought, especially

those that deal with complex ideas, must undergo preparation before they can be digested comfortably. The transactions of engineering societies are overburdened with half-baked chunks of writing that provoke mental dyspepsia. How palatable, on the other hand—how eupeptic—is the carefully prepared article that has been seasoned with Attic salt, served with a *sauce piquante*, and dressed with the parsley of pleasant fancy—like the writings of Rossiter Raymond or of Clarence King.

Composition, however, is less natural than speaking. The pen or the pencil intervenes between the thought and the expression, introducing an element of artificiality, as well as one of deliberation. The spoken word cannot be recalled; the written word can be erased. Yet it is unwise to criticize your writing as it proceeds, for such self-criticism tends to embarrassment or self-consciousness. Revise the work carefully after it is done, not before, so as to avoid chilling the warmth of composition by cold analysis. You have heard of the centipede who was too much aware of his many legs, and became hopelessly entangled. Inopportune self-criticism will cripple writing, just as self-consciousness prevents most men from becoming satisfactory after-dinner speakers.

Each of us has individuality, and that quality ought to be expressed in our writing. It is expressed in our speech, and it will be reflected in our writing if we do not assume an artificial manner. In a recent issue of the 'Christian Science Monitor' I found a friendly editorial on mining engineers; in this it was stated that the mining engineer "may sometimes seem a little short on grammar, but the vividness of his past experience provides its own sort of expression". The editor suggested that the mining engineer might say of himself, in the words of Don Marquis:

"I do not work in verse or prose,
I merely lay out words in rows;
The household words that Webster penned
I merely lay them end to end."

Evidently the editor of the 'Monitor' looked upon the engineer's literary effort as a sort of verbal brick-laying, lacking even a good mortar to bind the material into a satisfactory structure. Fortunately some of the mining engineers have something besides "past experience" to aid their powers of expression, and their contributions to the literature of the profession prove that their nomadic habits are no bar to the acquisition of a style that can well afford comparison with that of the daily press.

To be natural in writing, you must have something to say: something concerning which you feel impelled to write. To have something to say is the first requisite for effective speaking or writing. Most speeches and many writings are ineffective, if not worse, because, like an unhappy golfer, the speaker or writer does not see the object of his aim; he does not "keep his eye on the ball". Wait until you have something definite to tell. Only a fool talks for the sake of talking; that is why so many speeches fall flat. It is unnatural for a man to write for the sake of exercising his index finger and thumb; that is why so much writing is a weariness of the flesh. Make sure that you have something to say; then say it; and when you have said it, stop! "The best spoke in the wheel is the fittest, not the longest."

The story is told that ex-President Wilson, when a boy, used to read to his father whatever he wrote. Whereupon his father would ask, "What do you mean by that?" He would explain. "Then write it" was the advice. If, after writing something, you ask yourself, "What do I mean?" you may discover that you have not written what you meant to say.

The student while at college, and for some time afterward, is occupied mainly with the effort to acquire knowledge. To write is to convey information to others, which is the reverse of the normal youthful attitude; it involves a pose difficult to assume gracefully or effectively without practice; but such practice should be encouraged, because the effort to record thought involves the mobilization and marshalling of ideas,

a disciplinary effort highly beneficial to the student's mind. Therefore it were well if some exercise in writing could be taken during the early process of acquiring knowledge.

To write naturally, you must exercise the faculty of writing until it becomes flexible and strong. The best way to learn how to swim is to plunge into the water. Most of those who write well have written much, but you may be sure that they have not published all of it. Do your preliminary cantering in the paddock, not on the racecourse. The good writers obtained their reputation by being wise enough to keep their preliminary trials to themselves; meanwhile they noted the results obtained from the methods used by others. Ben Jonson said, "For a man to write well there are three necessities: to read the best authors, observe the best speakers, and much exercise of his own style". Naturalness comes from exercise, not from carelessness.

Aristotle said, long ago: "Naturalness is persuasive and artificiality the reverse; for people take offence at an artificial speaker, as if he were practising a design upon them, in the same way as they take offence at mixed wines".*

Some technical writers, aiming to be natural, succeed only in being slovenly.

If it is inconvenient to keep the **muck** [broken rock] drawn off, tap the **dirt-way** [chute] a few feet up, on the opposite side of the man-way.

The writer is describing a method of mining and uses the language of an uneducated laborer, perhaps with the idea that it sounds 'practical'. Here are two more examples:

With the **advent** [completion] of the new mill, which has a capacity of over 100 tons per day, the haulage problem becomes **one for careful consideration** [important].

'Advent' means the season before the Nativity; it is also used when referring to an important arrival, not the starting of a stamp-mill. The concluding clause in the quotation exemplifies the use of an abstract phrase instead of a concrete word.

* 'The Rhetoric of Aristotle'. Translated by J. E. C. Welldon, 1886.

The language is 'natural' to a semi-literate promoter but not to an educated engineer. Do not mistake vulgarity for ease, nor inaccuracy for freedom.

The process is said to have done such satisfactory work that other plants [operators] have been contemplating [considering] the installation [adoption] of the process [it].

This also illustrates an uncouthness that simulates naturalness. The writer, a graduate of a university, has fallen into the style of those about him in a mining community. The 'contemplation' of plans, the 'installation' of plants, the 'inauguration' of methods, and the 'prosecution' of developments are the stock-in-trade of local reporters and of the equally illiterate persons that play the mining 'game' on the frontiers of industry. The idea of imitating them should be repugnant to an educated engineer.

Young men, when about to describe a mine or explain a metallurgical process, are prone to start with the notion that they must indulge in 'fine' writing; meaning thereby a style pitched several tones higher than is habitual to them. When they prepare matter that is to be printed, they affect a vocabulary and a phraseology foreign to them; like the queer persons that have 'society' manners as distinguished from their behavior at home. There are public occasions, of course, when an added dignity of bearing is befitting. For similar reasons, it is proper that the irresponsibility and ease of ordinary talk should give place to deliberate thoughtfulness when one is making a business statement or preparing matter for print; but the extra effort should not entail a pomposity that smothers the subject in verbiage. The attempt to write in a key higher than that of conversation need not provoke insincerity or affectation; it requires only more care and more deliberation. Write as if addressing an honored senior in your own profession to whom you wish to convey information; do not try to impress him with your skill as a stylist, but make yourself perfectly clear, so that he may have the benefit of any facts or ideas that

you can place at his service. As a warning, I quote the following description of the Mount Morgan lode, in Australia:

It may be considered as consisting of a network of veins, traversing on the one hand a metamorphic matrix of a somewhat argillo-arenaceous composition and on the other hand what appears to be a feldspathic tufaceous igneous rock.

This is metamorphosed English pseudomorphs after flapp-doodle. Much of the geologic description that poses as profundity is rhetorical rot. Similarly the technical terms needlessly used by half-educated writers remind one "of the French that is spoken by those who do not speak French".

A Tasmanian geologist described an ore deposit thus:

It is due to the effects of a reduction in temperature of the hitherto liquefied hydro-plutonic solutions, and their consequent regular precipitation. These ascended in the form of metallic superheated vapors which combined eventually with ebullient steam to form other aqueous solutions, causing geyser-like discharges at the surface, aided by subterranean and irrepressible pressure.

What can you make of this "geyser-like discharge" of language? You will find, if you take the trouble to translate the pretentious terms, that the description conveys a minimum of information with a maximum of sound: "Full of sound and fury, signifying nothing". As Ruskin has said, a "great part of the supposed scientific knowledge of the day is simply bad English, and vanishes the moment you translate it".

Here is another sentence written by a young man that also mistook sound for sense:

Since the installation of their air-compressor, a new campaign of development has been inaugurated, operations have been extensively prosecuted, more particularly in the Carboniferous limestone, which is usually so prolific of values, due to the well recognized leaching of mineral solutions emanating from the plutonic magma.

Many of these words are out of place; a bishop is installed, a president is inaugurated, a criminal is prosecuted, a rabbit is prolific. Incidentally, it may be noted that the water that leached the limestone probably came from above, not from

below; it originated in rainfall, not from the depths. These grandiose words, being inappropriate, fail to convey a definite meaning; they only make a confusing noise. Probably he meant to say:

"The use of the new compressor has greatly expedited operations, particularly in the Carboniferous limestone, which has been enriched by mineral solutions."

This, however, is not satisfactory, because the sentence contains discrete ideas, wholly unrelated; therefore they should be separated, thus:

"The use of the new compressor has greatly expedited operations, particularly in the Carboniferous limestone. This is important, because the limestone has been enriched by mineral solutions, and therefore is a likely place for ore."

Writers on golf are guilty of many absurdities because usually they are selected on account of their skill with the mashie rather than with the pen. They do not write in a natural manner; they attempt a style that is as foreign to their subject as a wild flourish with the club is alien to a delicate approach. For example, J. H. Taylor contributes the following to 'Golf Illustrated':

To wear a mantle of a noble success is a splendid garment, but it becomes shoddy and rags if it be weaved in the loom of self-deception. There is no stability in it and it will not withstand the shower of a just reproof. . . . It was about this time that the advocates of the dull and shoddy heavier ball made their elephantine appearance. . . . Let us go back on to the track of my original theme and try and help the reader to realize that the heavy ball may possibly be an unjustifiable appendage to the game. . . . This stroke requires great incubus of judgment in elevation and strength and betrays the hand of the master when successful.

A garment is not made in a loom, although cloth is woven in such a machine. A condition ("to wear") can not become a thing ("a splendid garment") even by aid of rhetoric. What "elephantine" has to do with the advocates of a heavy golf-ball it is not easy to guess, any more than how the heaviness of the ball should make it an "appendage" to the royal and

ancient game. An "incubus" is a nightmare that weighs heavily on the sleeper; it has no connection with a stroke in golf except in so far as a weight on the mind may prevent the player from keeping his eye on the ball. A good stroke does not "betray" the hand of a master, for to betray is to yield treacherously or be disloyal; the stroke 'reveals' or 'betokens' the hand of a master.

Taylor makes himself ridiculous by thus adopting the language of a second-rate newspaper reporter. This kind of writing is entirely unnatural to a modest and sensible man such as I know this golf champion to be. He uses 'shoddy' in two senses, to characterize a metaphoric garment and to describe a heavy golf-ball; the word fits the kind of writing that he has borrowed for the nonce.

Samuel Johnson exclaimed: "Witness the immense pomposity of sesquipedalian verbiage"; and we observe how he himself sinned in that way. George Meredith, a master of words, recorded his objection to "conversing in tokens not standard coin", which is what 'prosecute', 'install', and 'prolific' are in a mining report; they are not legal tender on the bourse of technology; they are like Canadian quarters, British shillings, or French francs tendered to a merchant at Chicago or Denver, legal though they be at Montreal, Manchester, or Marseilles. As you know, I hold that the use of words of Latin origin, usually of more than one syllable, is helpful, if not indeed unavoidable in expressing ideas current in technology; but writing becomes incoherent when words are used because of their sound rather than their sense. Such usage betokens a snobbishness of mind, the aping of erudition, a mere pretence. If a man knows what a thing really is, he describes it as black or white; if he does not know what it is, he masks his ignorance by saying in long words that it partakes of the general quality of grayness. Young writers that clothe meagre observation in elaborate words soon fall into the habit of using terms they do not understand, and therefore fail to make themselves understood, if indeed they do not convey information that is

NATURALNESS

positively false. The employment of words that are unfamiliar to the writer, and in a manner that is inconsistent with his own way of saying things, serves but to cripple his power of expression. He may get into a tangle by dragging strange words from afar. When he does find himself thus entangled, he should cut loose, stating things in his own way, that is, in plain words that he understands thoroughly. Again I **REMEMBER THE READER**. If you do, you will win respect as a writer. The man with only a smattering of his subject who uses words of learned sound and unlearned meaning, because of his inability to make an impressive noise is more easily acquired than the reality of knowledge. Huxley said that if a man really knows his subject "he will be able to speak of it in simple and easy language and with the completeness of conviction which he talks of an every-day matter. If he does not, he will be afraid to wander beyond the limits of the technical phraseology which he has got up".* In his lectures to working men Huxley showed how the fundamental truths of science could be stated in the simplest and most illuminating speech without loss of accuracy. Indeed, the ability to explain scientific or technical matters to the unlearned is a test of the thoroughness of a teacher's understanding of his subject. If, for example, you care to test your grasp of engineering or geology, try to impart what you know to a younger brother or sister. That is a good test of your understanding and of your use of language.

* The concluding phrase illustrates how a great writer may lapse into poor English.

III. CLEARNESS

The notion prevails that writing is a knack, that the skilful use of the pen is a gift of nature. This is an error. Dogberry may be responsible for it; he said: "To be a well-informed man is the gift of fortune, but to write and read comes by nature". Because Dogberry said it, we may be sure that Shakespeare thought otherwise. Ability of any sort may be partly innate, but my own observation and experience lead me to conclude that most of the easy writers have become so by constant practice. As I recall those who have won reputations with their pens, I remember that most of them have written a great deal and have taken particular pains to improve their style. The suggestion that proficiency in the difficult art is a happy accident provokes a satirical smile. The larger part of the great writing in our literature is the result of persistent effort. An easy fluency has been the undoing of many; their flamboyant and fantastic scribbling has proved as perishable as froth.

This criticism applies to technical writing also; in order that a technical description or discussion may hold the interest of the reader, at least long enough to cause him to read it to the end, the writing must be done carefully and systematically; otherwise it will fail in its purpose of conveying information. Clearness is absolutely essential. "It is not enough to use language that *may* be understood; it is necessary to use language that *must* be understood."*

The purpose of writing, at least of that which is meant to be read by others, is not only to express ideas but to communicate them. Lack of perspicuity may prove as bad as

* Quoted by Hill from Quintilian.

untruthfulness. J. H. Finley, in his preface to George Crabb's 'English Synonyms', says advisedly: "For there be three classes of men who do not tell the truth except by accident; first, those who do not know it; second, those who wish not to tell it; and third, those who do not know how to tell it".

From first to last, REMEMBER THE READER: that is a rule never to be forgotten in any kind of writing except the diary. The diarist can shoot his words into the air; yours are aimed at the intelligence of a sympathetic human being. Consider him; if you do, you will escape half the pitfalls awaiting you.

Clearness of statement depends, first, on the choice of words; next, on the order in which they are arranged; then, on the sequence of clauses composing a sentence; and, finally, on the arrangement of sentences in a paragraph.

Select the word that is appropriate to your thought: the word that pertains to the thing described.

Food is wholesome; climate is healthful; a person is healthy.

A foundation is permanent; an orebody is persistent.

A climate is equable; a contract is equitable.

Judgment is held in suspense; sediment, in suspension.

A problem is unsolvable; a mineral, insoluble.

The force of steam was discovered; the steamboat was invented.

We measure distance in linear feet, but pedigree by lineal descent.

Good writing depends not so much upon a large vocabulary as upon the choice of words. The wrong word derails the thought; the needless word is an obstruction. A writer that flings needless words about him is like a swimmer that splashes; neither makes speed. The blue pencil of the editor is the symbol of excision because we recognize that it removes the useless members of the literary structure. Revision commonly denotes pruning. The dominant fault of the incapable writer is the employment of too many words. Even practised writers err in this respect; for example, H. G. Wells is fond of doubling his adjectives, thus:

In the preceding chapters there has been developed, in a clumsy, laborious way, a **smudgy, imperfect** picture.

More than one adjective may be needed to describe an object, but each adjective should convey a distinct meaning. Whether the adjectives in "smudgy, imperfect picture" overlap may be questioned. Probably if Mr. Wells had omitted "laborious" and "smudgy", he would have said as much, and more pleasantly. The proper use of adjectives and the use of proper adjectives can be studied profitably by any writer, however experienced.

Verbosity is a sign either of carelessness or of lack of time for care. Pliny wrote to a friend, nearly 1900 years ago, "I have not time to write you a short letter, therefore I have written you a long one".

On the other hand, the effort to compress may be carried too far. Not long ago the editor of a British paper had to shorten a story to fit a given space and he had to do it in a hurry; so the last few paragraphs were condensed into a single sentence, which ran thus:

The Earl took a Scotch high-ball, his hat, his departure, no notice of his pursuers, a revolver out of his hip-pocket, and, finally, his life.

Here is an example from a technical article:

They can distinguish in their own work between the lucky guess and the well-planned technical achievement.

One does not compare two things so essentially unlike as a guess and an achievement; the writer has omitted three necessary words, thus:

"They can distinguish in their own work between *the result* of a lucky guess and the well planned achievement."

Avoid words you do not know fore and aft. Do not be tempted into the use of high-sounding terms that frequently are employed to cover ignorance. Comprehensive words like 'development' and 'evolution' are often mere noise and smoke, not penetrating shot. As the old lady was grateful for "that blessed word 'Mesopotamia'", so that comfortable word

'metasomatic' has cloaked many nebulous notions of ore deposition. Likewise 'dynamic' is sadly overworked by perplexed geologists.

The **dynamic** power that shattered the mountains and created fissures in which the ore is now found.

So far as is indicated, the "power" might have been dynamite. It is amusing to recall how Ruskin twitted Tyndall for a similar indiscretion. Tyndall had referred to a certain theory, which was in debate, affirming that it, and the like of it, was a "dynamic power which operates against intellectual stagnation". Whereupon Ruskin commented thus: "How a dynamic power differs from an undynamic one, and, presumably, also, a potestatic dynamis from an unpotestatic one—and how much more scientific it is to say, instead of—that our spoon stirs our porridge—that it 'operates against the stagnation of our porridge', Professor Tyndall trusts the reader to recognize with admiration".

If you do not know how to characterize something you have seen, do not imagine you have done your duty when you have labeled it a 'phenomenon'. That is a generic term conveying to the scientific mind the idea of an observed fact, especially with relation to what is subject to change, as opposed to the essence of things; in a loose and popular acceptance it carries an impression of the unfamiliar; in either case the label 'phenomenon' explains nothing. Macaulay said: "I have often observed that a fine Greek compound is an excellent substitute for a reason".

In a recent controversy * a clever technician had much to say about "orogenic" when discussing the source of ore in veins. He made bold to play with it for awhile, but Greek terms, like razors, are not to be flourished recklessly. He had to be told that *ὄρος* means mountain and that 'orogenic' relates to mountain-making, not to the genesis of ore. Be warned therefore: know what a word denotes before you use it.

* Trans. Inst. M. & M., London, Vol. XXIV, p. 178.

In a recent issue of the 'Atlantic Monthly' I read this:

Authors are like miners: they put the precious metal into their books; but when one gets to the mine, there is apt to be a lot of 'slag' about!

The exclamation mark is well placed. The simile is confused. Apparently the idea is that as authors put precious things into their books, so miners put precious metal into their mines; but when one reads the book one finds a good deal of piffle scattered over the pages and when one goes to the mine one finds heaps of slag. The comparison might hold true if miners made slag at the mine; they do not; the slag is the refuse from smelting, an operation that is usually performed far from the mine. For "slag" read 'rock'. Part of the slag in the 'Atlantic' quotation is the word "apt", which is out of place. 'Apt' means 'suitable' or 'appropriate'; it is not a correct synonym for 'likely'.

The rule is to use the word that will be understood by the reader and that at the same time best expresses the meaning. "Too many cooks spoil the broth" is a simple statement, which 'Punch' transformed jocularly into "A superfluity of culinary assistance is apt to exercise a detrimental effect upon the *consommé*". That is the language of a newspaper reporter.

Avoid using words of similar sound but of different meaning in the same context.

When preparing this lecture I wrote:

By the way, I must ask you not to weigh the value of my admonitions entirely by the manner in which they are conveyed to you.

Noticing the similar sound of "way" and "weigh", I deleted the introductory clause.

In the 'Atlantic Monthly' again, I find:

But the cathedral is the gem of the scene, having the most beautiful nave I have ever seen.

An engineer writes about the shipment of machinery to the Philippine Islands:

A copy of the packing list should be included in each case or attached to each bundle.

Here "case" is a packing-case, but it might be mistaken for the common abstract phrase 'in each case'.

The main whistle answers with two long **blasts**, thus notifying all the men on the hill that the **blasting** is over.

Substitute 'calls' for "blasts". The 'blasting' refers to the explosions of dynamite used in breaking ore.

The requirement from the **management** [managers] of reports to stockholders, giving a detailed account of their stewardship, will be **corrective** of [correct] many of the abuses of **management** [corporate responsibility].

Here "management" is used in two different senses.

The proportion of the rainfall that sinks into the ground **naturally** varies according to the character of the underlying rocks. But, whatever the **nature** of the rocks may be, they are . . .

This was written by a geologist pre-eminent for good writing—James Geikie. The "naturally" does not refer to 'nature', it means 'obviously' or 'necessarily'.

A hydrographer writes:

This is **well** illustrated by **well** records.

A metallurgist remarks:

The first light on **the solution** of the problem was the discovery that the gold was **soluble** in a **solution** of an alkaline mono-sulphide.

The first phrase in black type can be deleted; and to prevent the awkwardness of using 'soluble' with 'solution' it would be an agreeable change to write that "the gold dissolves in a solution of an alkaline mono-sulphide".

The problem is not simple. The best **solution** would be to roast the ore carefully, forming a silver sulphate, which is **soluble** in hot water.

When writing concerning a chemical solution, do not refer in the same paragraph to the solution of the problem; likewise, when writing on geology, do not in the same context refer to the rock formation and to the formation of the ore deposit. The use of a word in different senses causes confusion of thought.

The principal **formation** in the district has been mentioned. The shale evidently has played no part in the **formation** [deposition] of the ore **deposits**.

The guides were held so strongly by the heavy mass of **unset** [moist] concrete that the jar from passing skips only **settled** [fixed] them more firmly into place, and the initial **set** [of timber] was not broken.

He may mean the 'set', or hardening, of the cement, but as he is writing concerning shaft-work, he may be referring to a 'set', or structure of timber; therefore he should insert 'of the concrete' or 'of timber', to explain. The use of 'unset', 'settled', and 'set' in the same context is bewildering.

This spherical shape can be maintained **only** if the pressure on the inside is greater than without. Surface-tension **only** can account for this excess.

Here 'only' is used twice and with different meanings. The second one should be replaced by 'alone'. The first sentence can be improved thus:

"The spherical shape can not be maintained unless the pressure . . ."

To suggest the terrors of careless writing in technology I quote the following reference to machine-shop design:

To ensure accuracy in cores set in drop points, it is well to make a special core box, which will fill up the point impressions over the core, as well as core [here a verb] the actual hole, and to see that the dimensions of points and core coincide exactly, thus leaving the molder nothing but to insert the core.

Let us hope that the molder has no feelings!

A loose **knot** is one **not** held firmly in place.

The **ore**, or the vein itself even, is hard to trace.

This machine is preferable **for** the **four** reasons already indicated.

Oliver Wendell Holmes said: "People that make puns are like wanton boys that put coppers on the railroad-tracks".

When you use a word that has more than one meaning, make clear the sense in which you are using it, by the context or by an explanation. Of two words that may be employed in the same sense, select the one susceptible of a single interpretation.

He prepared a **partial** account of the events that preceded the strike.

Was his account prejudiced or was it only incomplete?

This required the **partial** [part of the] time of a man who might be using this time [employed] to better advantage.

Sometimes **partially** [partly] formed pyrite crystals have barite between them, and the galena crystals are **partial** [incomplete] and enclose some barite. >

The 'New Republic' says:

In order to justify the sternness of the protest the case itself should be at least **partially** established.

Cases may be established partially, that is, with partiality. The editor meant 'in part' or 'partly'.

The work described herein forms part of a **partially** completed [an uncompleted] study of sulphur dioxide.

A 'partially' completed work may be one that is complete in part or one that is generally unfinished.

John W. Smith, the late manager of the Wild-Cat mine, was unable to make it pay.

Is Mr. Smith dead? Was he the former or was he the deceased manager? Or was he merely unpunctual? If he was alive when the sentence was written—and he was—he should have been described as "lately [or recently] the manager".

The geologists can help by reporting the **localities** [places] in the mine where water is going to waste.

He used "localities" because it has a bigger sound; it is vague, whereas he needs to be definite in his statement.

A pair of analytical balances

It is the pair of pans hanging at the ends of the lever that constitute the balance. He says, but does not mean, two balances. This reminds me that 'balance' is used frequently and improperly for 'remainder'; thus:

Ten centimetres of the wire was used for the test; the **balance** [remainder] was thrown away;

Two hundred of the men left the mine, the **balance** [others] continued at work.



'Balance' primarily refers to a condition of equilibrium, to a state of neutrality or equalization. It is well to use words in their primary sense.

Distinguish between 'farther' and 'further'; the first should be used when referring to physical distance, the latter to the metaphorical.

At Brest, where France projects **furthest** [farthest] west.

We were unable to go **further** [farther] toward the summit.

To proceed **farther** [further] with this policy would be a mistake.

The **farther** [further] he went with his experiments, the more confident he became.

The meaning is made clear by using the right adjective, that is, the one that belongs to the idea to be expressed.

The admixture of salt in roasting led to a **lower** [cleaner] residue.

He means the leaving of a residue containing less of the metal he was trying to extract.

He gets **greater** production and better **production** for each dollar invested in labor.

He means "a larger production and a better product".

This time might easily extend to as **high** [long] as ten days.

The idea of extension here involves length, not height.

The ore was poor at surface, and even **worse** [poorer] on the second level, but it is distinctly good [rich] on the third.

'Rich' and 'poor', 'good' and 'bad', 'high' and 'low' are the correct antonyms.

The return was small, because the capital was **high** [large].

This method is as **perfect** [good] as any other.

I have had the chance to see the results of both good and **poor** [bad] packing.

The crude ore is not as good, but the concentrate is no **lower** [better], because it is cleaner.

"The crude ore is poorer, but the concentrate continues to be as rich, because it is cleaner."

CLEARNESS

To find the type of institutions best calculated to help the better and repress the **pernicious** [worse] tendencies is the task of the philosopher-enquirer.

So says Bryce. The use of "pernicious" instead of "worse" spoils the force of contrast with "better".

The choice of the right adverbial phrase is important, thus:

The iron rods were heated to such **an extent** [a degree] that the brazing was destroyed.

The yield of gold on the plane of the vein had been \$4 per square foot **over** [more than] the reduction cost.

The use of a noun as a verb may be a colloquial error, as in:

Two men **coal** the shovel quickly.

It looks like an interchange—a slip of the pen; he must mean "shovel the coal", you say. No, he means supplying coal to the boiler of a steam-shovel.

The failure to repeat a necessary word may obscure the true sense.

Wages at the leading mines of the country have been cut from 15 to 17%. This is far below the reduction in other lines of industry.

The word "cut" should be repeated after "this" in order to make the statement clear. Moreover, the cut was not "from 15 to 17%", it was from some amount to some less amount, say, from \$5 to \$4.20. "From" should be omitted. The sentence means:

"The wages paid at the principal mines of the country have been cut 15 to 17%; this cut is less than that made in other branches of industry."

Avoid needless indirection, as by using a double negative:

The details of the methods used abroad are **not unknown** to American chemists.

He proceeds to state that they are known thoroughly.

They restrict the performance of the work to certain methods which are **not inconsistent** with economy.

"They restrict themselves to methods that are consistent with economy."

The **inefficiency** [efficiency] of labor at these mines has **increased** [decreased] very little.

The affirmative is preferable to the indirect negative, for example:

In this part of Mexico the vitreous type of rhyolite is **not uncommon** [common].

The choice of the right article is important.

Reduce the loss in the residue to a [the] minimum.

He said 'a' as an elegant variation on 'the', which he had used twice just before, but the use of 'a' before minimum suggests that he did not know what was *the* minimum attainable. This is a common blunder. I quote two more examples:

The annual rainfall **averages** less than five inches as a [the] maximum.

He is speaking of a desert country and probably means that the average rainfall rarely exceeds five inches per annum.

With the use of a [the] maximum amount of water

It were better to state the quantity of water.

I used a process in which manganese oxide serves as purifier of the electrolyte.

He means: "I used the process in which manganese oxide is used to purify the electrolyte". It was a particular process, well known to those interested in the subject—that of refining zinc.

He used **the** method that he had learned while at Broken Hill, in Australia.

The 'method' is not explained or described; it remains 'a method'; therefore 'a' should replace "the"; otherwise his readers are likely to be puzzled.

As a **result** they have **very** few breakages or losses occur to **their** goods.

He has been describing an efficient method of packing, *the* logical result (not *a* result) of which is to prevent breakages. As to the fewness, that is a matter of opinion, based upon experience. He means to say:

"In consequence they have few breakages or losses."

Do not confuse time with place. For example:

The ore **sometimes** [in places] has a distinctly banded structure.

Such ore deposits are of **frequent occurrence** [numerous or of common occurrence] in Nevada.

This kind of ore is **frequently met with** in Colorado.

One does not "meet with" ore either once or many times; the sentence should read:

"This kind of ore is found in many mines in Colorado."

Meta-cinnabarite is not a **very** common mineral, and **when** [where] it **does occur** [is found] there is usually some cinnabar **with it**.

Delete "very" and "with it", thus placing "meta-cinnabarite" and "cinnabar" in emphatic positions at the beginning and end, respectively, of the sentence.

The pyrite outcrop is **always** [everywhere] oxidized.

[Some of] These crystals are **sometimes** as much as an inch in diameter.

Richer ore is invariably found **when** [where] the lodes are in the sandstone.

At times [In places] the vein pinches to a mere thread.

The vein **when** [where] it is thickest breaks into small stringers.

This method cannot be recommended **when** [if] applied to slime.

The idea of time is not involved. He means:

"This method cannot be recommended for the treatment of slime."

The correct adverbial phrase is more descriptive, it evokes the right image and thereby fulfils the purpose of language.

This coal has been measured **in several instances** [at several points or in several places].

True conglomerate was observed **on rare occasions** [rarely or at points widely separated].

Only **part of the time** [in places] will erosion expose the formation for our study.

The formation in which the deposits occur is hornblende-schist, which near the surface is **often** [in several places] altered to chlorite-schist.

The introductory clause is not commendable; he is speaking of one ore deposit; he used the plural unnecessarily, and employs that tiresome word 'occur'. He means to say that the 'ore-bearing rock', or the 'rock enclosing the ore deposit', is hornblende-schist.

In fitting one piece to another, common calipers are **frequently** used.

They are not used "frequently"; he means that they are in common use or are commonly used.

When [where] the cost of sulphuric acid is high, and where the quantity of shale to be retorted is small, **then** [there] **and in such case** it is possible that the probable financial results would not warrant the expenditure of capital required to construct the plant for the manufacture of the ammonium sulphate.

It is not a question of time but of place; he is referring to the exploitation of shale in remote localities. "And in such case" is redundant; it is a mere frill. So also are the words "it is possible that". He means that *where* sundry conditions prevail *there* "the probable financial result might not warrant the expenditure".

The intelligent use of the common adverbs is a great help to clearness of expression, and I venture to emphasize it with further quotations from manuscripts that I have revised. Here are five in which 'where' is employed in place of a more suitable adverbial phrase:

Mr. Tucker quotes from an English novel **where** [in which] a peer of the realm speaks . . .

These formulæ are applicable to the case **where** [in which] one concentrate only is made.

'Case' is a vacuous word; he means 'process'.

I have come across several instances **where** [in which] the presence of zinc was detrimental.

Any business **where** [in which] the element of chance is unavoidable.

When the percentage of copper diminished to a point **where** [at which] the ores could not be profitably smelted.

This can be improved in several ways, thus:

"When the copper content fell so low that the ore could not be smelted profitably."

The geologist **located** non-magnetic bodies of iron ore **when** [where] these bodies **occupied** [bore] a **certain** definite relation to magnetic beds **which** [that] were themselves too lean in magnetite to constitute ore.

One 'locates' a claim, but 'finds' or 'discovers' an ore deposit. "Certain" is redundant.

The rich veins diminish **often** in richness as depth is gained.

If they diminish "often" they must soon be done to a frazzle. It does not require a Byzantine logothete * to inform the student that the adverb must be put as near as possible to the word it modifies. Here "often" modifies "diminish", and it might precede that verb; but, more truly, "often" modifies the whole statement, and it would be better to say, "Often the veins diminish in richness as depth is gained". However he does not mean "often"; he means that 'many' or 'most' of the veins become impoverished with increase of depth, and he ought to say so. As the stage reeled close to the edge of the precipice the timid passenger asked the driver, "Do people *often* fall over the edge here?" "No", said the driver, "only once".

These rocks are nearly **always** red.

"Most of these rocks are red."

These pebbles are **almost never** striated.

"Few of these pebbles are striated", or "Only a few of the pebbles are striated".

The rock contains **much** altered plagioclase.

* One of my critics objected to this, because he failed to note that the use of "done to a frazzle" had provoked a second unconscious plagiarism from Theodore Roosevelt. *Stet!*

He means not a large proportion of altered plagioclase but much-altered or greatly altered plagioclase.*

One of the humors of turbid writing is the mixing of metaphors, a fault due to the failure of the writer to visualize the picture of his imagination; it illustrates the fact that clear writing requires clear thinking.

The currents [of policy] upon which he [Franklin] was being borne were steadily moving toward the jaws of the maelstrom.

He did not have the right picture of a maelstrom, the approach to which is felt by the suction of the whirlpool. However, this slip is not as bad as the following, in which several such blunders appear.

Technology is subordinate to latent shrewdness in sifting facts from the mists and shadows of the past. The experience of the engineer will enable him to eliminate much of the chaff, because many of the stories will collapse under the searchlight of engineering common sense.

He was pleased, as I happen to know, with his own style of writing. If he had applied a little "engineering common-sense", with or without a searchlight, he might have saved himself from such a lapse. Facts are sifted from fancies, not from mists and shadows. A searchlight will not cause the chaff to collapse, it will assist the eye in separating the chaff from the grain.

Alliteration likewise has its pitfalls for the careless:

When the dressing of a mine for sale is carried too far it comes plainly under [within] the category of sinful salting.

'Salting' means the artificial enriching of ore in a mine for the purpose of deception; therefore "sinful" is redundant, if not silly.

Do not hesitate to define a term the meaning of which may be doubted. When you do so, avoid the use of terms that themselves need to be explained. As Samuel Johnson said: "To

* From G. M. Wood's 'The Principal Faults Found in Manuscripts Submitted for Publication by Members of the United States Geological Survey', 1907.

explain, requires the use of terms less abstruse than that which is to be explained, and such terms cannot always be found. For as nothing can be proved but by supposing something intuitively known, and evident without proof, so nothing can be defined but by the use of words too plain to admit of definition”.

Dr. Johnson sinned grossly against his own precept; for example, he defined a ‘network’ as “that which is reticulated or decussated at equal distances with interstices between the intersections”. A fisherman, when a witness in court, defined a net as “little square holes with string tied around them”.

Sydney Smith defined an archdeacon as “a man who performs archidiaconal functions”—which left things worse than ever.

The cementitious character of Portland cement is due to . . .

This is like saying that the essential quality of eggs is egginess. He meant to say that the constituent to which cement owes its essential binding quality is a silicate of lime, or, more exactly, tri-calcic silicate.

The same writer, in a book of some pretensions, said:

In calcareous materials lime predominates.

He appears to be ignorant of the derivation of “calcareous”, which comes from *calx*, lime.

The lime thus calcined

This also comes from the book on cement, in which the author uses the words ‘lime’ and ‘limestone’ interchangeably and therefore confusedly, because lime is calcium oxide (CaO) and limestone is calcium carbonate (CaCO_3). The ‘burning’, or ‘calcining’, of limestone yields lime, by expelling the carbonic acid (CO_2). All this is elementary, and therefore it should not be ignored by one who undertakes to teach the technique of cement-making. As Sir James J. Thompson has said: “If you want to arrive at intelligible issues—not to say conclusions—in any discussion, begin by settling the meaning of the terms you are going to use”.

Do not define in terms that need to be defined; do not spare definitions. Many technical articles lead nowhere, simply because the writer has not made it clear whither he is driving. To discuss the persistence of ore in depth, for example, is hopeless unless the principal terms, 'ore' and 'depth', are defined. Definitions tend to clear the thought of the writer no less than they clarify the understanding of the reader.

Of William James, the philosopher, whose letters have been published recently, it is said that to him writing was "a mode of communication, rather than of objectivation". He was intimate and personal. "I don't care how incorrect language may be", he said, "if it only has fitness of epithet, energy, and clearness." He seems to have been intensely conscious of the person to whom he was writing, and exerted himself to conquer the understanding and win the sympathy of that person. He depicted his ideas and fitted them to the minds of his readers. The allusion to "incorrect language" is needlessly disarming, for when a writer selects his epithets with skill, puts the pulse of life into his periods, and makes his meaning clear, he has achieved the correctness of language for which we strive continually.

IV. PRECISION

"The chief aim in style ought to be absolute precision", said Flaubert. "There is only one noun that can express your idea, only one verb that can set that idea in motion, and only one adjective that is the proper epithet for that noun." Let this be your motto. The engineer tries to be exact in all his measurements; he should measure his language with similar exactness. The technical term is a word of precision. It is not only precise, it is a word-saver. To the unscientific the earth is "a ball slightly flattened at the poles, something like an orange". To the scientific it is "an oblate spheroid". A similar contrast between the precision of the technical term and the vagueness of common words is afforded by a conversation between Ivanhoe and Rebecca:

"What device does he bear on his shield?" asked Ivanhoe.

"Something resembling a bar of iron, and a padlock painted blue on a black shield."

"A fetterlock and shacklebolt azure", said Ivanhoe"—using the technical terms of heraldry.

It is good style in writing, however, to adapt your manner of expression to the intelligence and experience of the person or persons to whom the writing is addressed. The description of a mine should be worded differently according as it is intended to inform a mining engineer, a director, or a bishop. REMEMBER THE READER. It is as incorrect to write in a technical way for a non-technical reader as to write in a popular way for a technical or scientific reader. That style is best which enables the writer to place himself in the closest mental touch with his reader, to establish the maximum of sympathetic understanding. Let your precision be proportioned to your accuracy. You should not try to be precise in matters that do not admit of

accuracy, any more than you should be vague in matters that require exactness. The technical writer must be sincere. Sincerity is the first essential of all good work. It is absurd to state the average gold content of the ore in a mine to thousandths of a pennyweight, because no sampling can be done so accurately as to give results trustworthy within such narrow limits.

An engineer at the Globe & Phoenix mine in Rhodesia, for example, estimated the average assay-value of the gold ore in that mine on June 30, 1910, at 32.239 dwt. per ton. The three decimals were only a florid decoration. The same engineer gave the total tonnage of the ore as 174,788. The last three figures signified nothing; they were only an arithmetic frill. He could not ascertain the average gold-content within half a pennyweight per ton, nor could he estimate the available tonnage of ore within a thousand tons. The sequel proved that even these limits of accuracy were beyond his ability.

Another engineer gave the value of the average gold-content of the gravel to be dredged on the Natomas property, in California, to four decimals of a cent per cubic yard. On January 1, 1909, he estimated a yardage of 342,995,536, and a gross yield of 9.9395 cents per cubic yard. In each set of figures the last three were merely pretentious. Such meticulous precision is an impertinence to the profession; it is an imposition on the public. The estimate was wrong by several million dollars.

Do not express a forecast in terms of history nor an approximation in terms of definition; in short, shun any form of affectation. Science is truth. As elaborate precision of statement is out of place in an inexact generalization, so also beauty of phrasing may defeat the purpose of writing if it be intended to accomplish a non-æsthetic purpose. Ruskin wrote so exquisitely that people missed the moral of his utterances in the enjoyment of his assonant periods. He recognized the fact too late, and expressed his regret. In a letter on 'The Mystery of Life', in 1868, he said: "For I have had what in many respects

I boldly call the misfortune to set my words sometimes prettily together; not without a foolish vanity in the poor knack of doing so; until I was heavily punished for this pride by finding that many people thought of the words only and cared nothing for their meaning”.

Suit the style to the purpose; fitness is the essence of good taste.

Words like ‘percentage’ and ‘ratio’ are terms of precision; so are decimals; they should not be used in making approximations or rough estimates.

The operation will take **about** 1.5 hours.

The statement is an approximation and should read

“The operation will take an hour and a half.”

About 50% [half] of the old hands returned each season.

The tailings from the vanners consist of **approximately 75%** sand and **25%** slime.

To say ‘**75%**’ is not an approximation; it is a precise statement, not warranted in this instance. He means:

“The tailing from the vanners consists of three parts sand and one part slime.”

This increased the **percentage** [proportion] of colloids in the flotation cell.

A large **per cent** [part] of the oil lost will probably be recovered.

The word ‘percentage’ should not be used without reference to exact figures; it is a term of precision and should not be employed otherwise.

This is sufficient to carry with it a **considerable percentage** [large proportion] of this dust.

The concentration is in the **proportion** [ratio] of 20 : 1, the concentrate representing **5%** of the crude ore.

‘Ratio’ should not be confused with ‘proportion’. The first refers to the quantitative relation between two similar magnitudes, as, for example, the numbers of two kinds of things may be “in the ratio of three to two”. The second means the

comparative part; for example, "a large proportion of the earth's surface".

These samples were found to contain [as much as 9% of] potash in amount as high as 9%.

If one loses a poodle-dog it may be better to offer a reward of \$1.00 instead of \$1, because the ciphers are impressive, but in serious business they are either without meaning or else misleading, except when they are intended to mark the absence of a fraction; thus:

The cost of mining was \$2.12 per ton; of milling, \$1.00; so that the total operating cost was \$3.12 per ton.

The two ciphers after the \$1 indicate that the cost of milling happened to be exactly that amount.

The hankering for the abstract is exemplified by the vogue attained by 'value' and 'values' in mining reports. In a stope or in a mill the use of 'value' in this way may cause no confusion, even if it be an objectionable colloquialism, but in technical writing it should be taboo, as the very type of all that is non-descriptive and unscientific. "This mill is intended to catch the *values* in the ore" is a vague way of stating that the mill is designed to extract the gold or silver, the copper or the zinc—in short, the valuable metals in the ore. In one mill the zinc, for example, may be not only valueless but a deleterious impurity; in another the copper may be insufficient in quantity to be extracted profitably, but sufficient to interfere with the saving of the gold by cyanidation. 'Value' is the worth or desirability of a thing; it is an attribute, not a substance. A man who designs a mill "to catch the values" might as well build a railroad to pursue a quadratic equation.

In sinking, the values were lost.

He meant that the vein or lode became barren.

And then the gold values are precipitated on zinc shavings.

No, it is the metallic gold that is precipitated; one can precipitate a panic by reckless banking, but one can not pre-

capitate anything so intangible as 'values' on something so tangible as 'zinc shaving'. As the farmer said, "It ain't in the nature of things".

A mining engineer sent a cablegram from Nigeria stating:

There are many years' work ahead and from actual results the ground is good in **values**.

The ground might be rich in vulgar fractions!

All **values** can be freed from the gangue by better crushing.

The gangue will be much relieved when these ghosts are exorcized.

It might be supposed that the beating of such particles of **metallic values** [metal] against the side of the tube-mill would anneal them and put **such values** [them] into leaf form.

The gold **values** are not chemically united in pyrite as a sulphide of iron and gold.

He means: "The gold in the pyritic ore is not chemically combined as a sulphide of iron and gold".

Better **values** are, however, obtained above the 1970-ft. level as the lode is opened up.

"Better assays, however, are obtained above the 1970-ft. level as the lode is opened up."

Rich sand in which the gold and platinum **values** are flaky and coated.

Here "values" is interjected from force of habit. 'Value' cannot be "flaky or coated". Delete "values".

Along the rivers the **values** are coarser than in the beaches.

He is referring to the particles of platinum; he should say so.

The **highest copper values** are concentrated along the post-dacite faults.

"The copper is concentrated along the post-dacite faults."

Sufficient examples have been quoted. The misuse of this word is among the most objectionable of technical solecisms. It connotes utter lack of precision. Usually it serves only to

befog the meaning, for even if the reader guesses that the writer is referring to a particular metal or mineral, the use of 'value' suggests such a proportion of the metal or mineral as will yield an economic gain, or profit. Only too frequently 'value' is used to designate mineral or rock containing too little of the valuable metal to be a source of profit—that is, to be 'ore'. In short, the woolly use of 'value' becomes a means of conveying an untruth. No word in the vocabulary of the mining engineer must be used with greater care than 'value'. It is a disgrace to the mining engineering profession that this term should be employed so loosely. Sir Clifford Allbutt has said truly: "It is strange that scientific men who habitually work in dimensions of a ten-thousandth of an inch are either blind to gross confusions of argument and to false refractions of meaning or regard them with indifference".

One of the greatest enemies to precision in technical writing is the use of the abstract instead of the concrete. An abstract noun denotes quality, state, or action, apart from anything possessing the quality, state, or action. For instance, in preparing my first lecture, I wrote: "Words are intended *for the conveyance of ideas*". Later I corrected myself: "Words are intended to convey ideas". Again, I wrote: "If you do so, you will *succeed in avoiding* most of the grosser errors". This I changed to: "If you do so, you will avoid most of the grosser errors".

Prefer the concrete to the abstract; the direct statement to the roundabout. The use of the abstract tends to circumlocution; it leads to obscurities that are fatal to precision.

Such deposits of quartz are not valuable unless they are close to **cheap transportation**.

The abstraction "**cheap transportation**" is a mere indirection in place of the concrete idea expressed by 'railway' or 'steamer'; he does not say which.

When tungsten ore occurs in disseminated grains, it is more difficult of **detection** [to detect] than when it is found in masses of considerable size.

It is this accumulation of ore that is at the same time the cause of present conditions and a preventative of an early release of the embargo.

This statement is burdened with many useless words. "Preventative", of course, is a sophomoric blunder. Even the use of 'preventive' would be a roundabout way of stating what he means. I suggest a change to:

"This accumulation of ore threatens the market and prevents an early release of the embargo." The embargo refers to the refusal of the local smelters to treat more ore.

When the oxygen in air is gradually reduced very little effect may be noticed before the occurrence of impairment of the senses and loss of power over the limbs.

A loss of power in the writer's pen may be noticed likewise. His two abstract nouns, "occurrence" and "impairment", becloud his meaning almost to the vanishing point. He is speaking of ventilation in a mine; he means:

"When the oxygen in air is reduced gradually, the effect may not be noticed until the senses are weakened and the power to control the limbs is lost."

As pig-iron was used for the precipitation of [to precipitate] the copper . . .

Fine grinding was introduced, and with it the more or less complete elimination of amalgamation as one of the means of extracting the precious metal from the ore.

To introduce "the elimination of amalgamation" is not good form in literary society. He means:

"Fine grinding was adopted, whereupon amalgamation became no longer necessary to extract the gold from the ore."

In order that the subsequent sinking through the rock to the coal-bearing veins could be proceeded with.

The statement is improved by substituting the direct phrase for the circumlocution, thus: "In order that it might be possible to sink through the rock to the coal-seams when necessary".

He continued the drift so long as the richness of the ore lasted and then he ceased his exploration.

"He continued the drift only so long as the rich ore lasted."

The mill-superintendent found that he improved the extraction of the gold by a previous precipitation of the copper in the ore.

"The mill-superintendent found that he could extract more of the gold if he first precipitated the copper in the ore."

If the feast-days were not of such frequent occurrence [so frequent]

Much had been done in the investigation and study of [to investigate] the local geology.

Investigation involves study.

The glass model of the mine is most instructive and illuminating in setting forth the nature of the development, exploitation, and geological features of the property.

"The glass model shows admirably the development, exploitation, and geology of the mine."

Anything that tends toward atrophying [to atrophy] the power of the individual . . .

Nothing tends so much to atrophy the function of writing as the frequent use of the abstract instead of the concrete. As Spencer said: "Exactness is not only unappreciated by, but even repugnant to, minds in low stages".

It seems rather a waste of opportunity to fall back on 'basic salts' when there are so many other scintillating resources open to our pencil-and-paper speculative chemistry.

He spent too much effort in scintillating and not enough on correct expression; he uses "chemistry" for 'chemists', the abstract for the concrete, and thereby spoils his rhetorical outburst.

Of nouns, prefer the concrete to the abstract; of verbs, choose the active voice rather than the passive, and the positive rather than the negative.

An outline of the process may be of help to those not familiar with cyanidation.

Delete the three words indicated.

These alloyed metals are the most difficult of solution [to dissolve].

By a refusal to recognize the union he secured an assurance of freedom in his operations.

"By refusing to recognize the union, he assured himself freedom in his operations."

North of these veins there is an enormous body of hematite iron ore extending many thousand feet in length and covering a large number of claims.

This is unworthy of an engineer. Note the lack of precision; he should state the size of the orebody, the number of feet in its length, and the number of claims it covers. On the other hand, he need not use "iron" with "hematite", because the latter is a typical iron ore.

This makes it necessary to determine the value of all sorts of property, a task that will be productive of [create] endless disputes.

The direct statement is more explicit.

This will be dependent upon other conditions.

"This will depend upon other conditions."

"A remarkably cheap machine" is better than "A machine of remarkable cheapness". "He increased the speed of the machine" is better than "The machine was given an increase of speed". As Quiller-Couch says:* "The first virtue, the touchstone of a masculine style, is its use of the active verb and the concrete noun. When you write in the active voice, 'They gave him a silver teapot', you write as a man. When you write 'He was made the recipient of a silver teapot', you write jargon".

Those who hanker for the abstract also use the plural unnecessarily.

An effort to obtain further reduction in working costs . . .

* 'The Art of Writing', p. 96.

Here an abstract noun and the plural are used to make a vague statement, instead of saying:

"An effort to reduce the working cost still further . . . "

The extra costs to be met with as depth is obtained . . .

Why the plural of cost? Note also the childish "to be met with". He means:

"The increased cost to be incurred as depth is attained . . . "

The ores occur in limestone and are thoroughly oxidized, so that the occurrence of galena is rather uncommon.

He was writing about the ore of a particular mine remarkable for containing a peculiar kind of galena used in the apparatus of wireless telegraphy.

"The ore is found in limestone and is thoroughly oxidized, so that galena is scarce."

. . . resulting in less losses of gold and lower costs, 56 to 35 cents per cubic yard.

Why the plural? He means:

" . . . the result being a smaller loss of gold and the reduction of the cost from 56 cents per cubic yard to 35 cents."

The discoverers were guided to the outcrop by the occurrence of the gold in the gravels of the neighborhood.

The "occurrence" did not guide them, but the gold that they found.

"The discoverers were guided to the outcrop by the finding of gold in the gravel near-by."

Why "gravels"? Because it sounds more comprehensive, more inclusive, more magnificent. The squandering of that valuable inflection, the plural, is all part of the love for the abstract, the dislike of the concrete. In the above example the writer was referring to a deposit of gravel, possibly to more than one deposit of gravel, but not several kinds of gravel. One might suppose that each bit of stone in such an alluvial deposit was a 'gravel' and that the accumulation of them made

'gravels'. Ignorant men undoubtedly have this idea. As used in geology, 'gravel' is a term covering a particular kind of deposit; it is a collective noun for the material in such a deposit. In similar fashion careless writers talk about "a vein in the slates", recalling the individual slates on which they did sums when small boys, or thinking of the 'slates' used for roofing. In geology, 'slate' is a rock characterized by a cleavage independent of the planes of sedimentation. 'Slates' should refer to several series of strata composed of such rock. The man who uses 'gravels' and 'slates' when he means to refer to a deposit of the one kind or to a rock of the other kind has squandered a useful inflection; and when he wishes to indicate several kinds or deposits of either 'gravel' or 'slate', by using the plural, he is unable to do so.

Until a few years ago it was the invariable custom when referring to various mill-products to speak and write of 'slimes', 'sands', 'tailings', 'middlings', and 'concentrates'. The singular had dropped out of use. Indeed, habitual carelessness of speech has developed such an absurdity as the use of 'tailings' to indicate the pyritic concentrate collected in the stamp-mills of Colorado, and the employment of 'rock' to designate the copper ore of Michigan. Engineers write of the 'ores' of a mine that produces only one kind of ore and talk of the 'rocks' that a vein traverses when it is wholly encased in one kind of rock.

This is a mormonism of style; it leans toward the vague and poetic, as we speak of "the sands of Time". It bespeaks that inveterate love of the abstract against which I have been warning you. In technology, the unnecessary plural (I had written "these unnecessary plurals", but corrected myself) is an obstacle to precision. For instance, a 'concentrate' is the product of a concentrating process; if several such products are obtained, as may happen, they are called correctly 'concentrates'. Thus:

At Broken Hill the mills produce lead and zinc concentrates, the lead concentrate being more easy to sell than the zinc.

Does not the discriminating use of the plural inflection help to make the meaning clear? Here is another good example:

An intimate mixture of the pyritic and the lead concentrates is made, resulting in a product assaying 15 oz. alike in gold and silver, and about 25% lead.

These two products of concentration, characterized by the predominance of pyrite and galena, respectively, are mixed to form one product before shipment to the smelter.

Seven different slimes were tested, the results being given herewith. These slimes are derived from as many ores, from different parts of the mine or from several dumps.

Note the value of the plural in 'slimes', 'results', 'ores', 'parts', and 'dumps'.

The pulp in a mill, when classified, is separated into a coarse product, 'sand', and a fine product, 'slime'. More than one kind of these products is made.

An experiment was made on two sands having the following analyses: Which sands is the finest?

He meant "Which sand is the finer?" A more intelligent writer says:

Here, as at El Oro, one can calculate exactly the extraction from a sand when the sizing test has been made.

The discard from a mill or machine is the 'tailing'. Suppose, as often happens, that the discards from several machines are mingled while on their way to be re-treated by another machine, how are you to express the idea if you have beggared yourself of your distinction between singular and plural?

The zinc concentrate assayed 55.8% zinc and contained 54.6% of the zinc in the copper-zinc ore, not counting the further recoveries of copper and zinc concentrates to be made from the middling when returned for re-treatment to the flotation machine.

Two concentrates were obtained, one containing most of the copper and the other most of the zinc, not one copper-zinc concentrate. This is made clear by the discriminating use of

the singular in the phrases "the zinc concentrate" and "from the middling".

This idea of not returning the middling to the machine that has separated it, has been adopted as a vital principle of the mill. The middlings of the classifying jigs (products No. 8 and 9) and the hutch-product (No. 13) are crushed separately through fine rolls. The crushed product has the characteristic that practically all the galena freed by crushing is found in the fine sand and slime, and that the oversize of a 22-mesh screen (0.6 mm. aperture) does not contain sufficient free galena to make it worth while to concentrate the oversize before re-grinding.

Note the intelligent use of the singular of 'middling' in the opening sentence and the effective use of the plural immediately afterward. If the plural of 'sand', 'slime', 'oversize', and 'product' had been employed in the fashion of the ordinary careless writer, the meaning of the statement would have been fogged. It is not easy to write clearly on such highly technical operations, and it is impossible to do so unless we use every device for making fine distinctions. One of the elementary distinctions is furnished by the plural; why throw it away?

I took my wife's watch to a jeweler to be regulated. When he returned it to me, he said: "You had better tell *those parties* not to wind the watch so tight". He knew the watch belonged to a lady—to an individual—yet he referred to her as if she were a mob.

On this detail in technical writing I have insisted for many years, and not without effect. When, in 1903, the leaders in technical science in South Africa decided to prepare a comprehensive treatise on the mining and metallurgy of the great goldfield of the Witwatersrand they issued a style-sheet requesting contributors to use 'slime', 'concentrate', 'tailing', and so forth, unless the reference was to several of these products. Many American technical writers and practising engineers have adopted my suggestion. Other mormonisms persist. Writers speak of 'fines' but they do not say 'coarses'; why not use 'fine' in contrast to 'coarse'? Writers on the geology of mining districts often speak of 'schists', 'limestones', and

'sandstones', when the reference is to one, and only one, terrain or formation of schist, limestone, or sandstone. Here again the idea lurks in the background that a layer of limestone is a limestone, a bed of sandstone is a sandstone, and a lamina of schist is a schist. It is impossible to tell from the statements of such writers whether they are speaking of several similar formations or of several kinds of limestone or schist.

The vein crossed the bedded sandstones.

He means "the beds of sandstone".

The banded ironstones have been much disturbed and shattered.

This refers to a single formation of banded ironstone; he has his eye on the multiple bands of the ironstone.

The slates being highly silicified cause the main lode shear-lines to split.

He means that "the silicification of the slate causes a splitting of the shear-zone that constitutes the main lode".

The mining of the oil-shales at De Beque . . .

As if each layer were a 'shale'!

The quartzites which lie between the limestone in Bingham canyon also are ore-bearing.

How can quartzites be between a limestone—several things between one? He means:

"Similarly the quartzite between the beds of limestone in Bingham canyon is ore-bearing."

Coal for domestic use in England was formerly called 'sea-coals', because it came by sea and because each piece was supposed to be a 'coal', and some Englishmen still speak of 'coals', meaning the fuel, whereas in America, the plural is used only to signify several kinds of coal.

Note the fondness for the plural in references to depth:

In this mine the ore has been followed to great depths.

He means "to great depth".

Rich ore has been found to considerable depths.

In such phrases the plural causes vagueness, and presumably to ignorant persons it seems more impressive for that reason. As a technical statement it loses in precision and in effectiveness. Substitute the singular and see for yourself. Better, however, than either the singular or the plural of 'depth' would be the actual distance in feet, for the term 'depth' is relative and means little apart from some standard by which it may be measured.

Here are more examples of the unnecessary plural:

The labor situation on these fields is critical.

This is a common British vulgarism. The reference is to a particular goldfield, that of the Rand. 'Fields' is bucolic.

In January we treated 3186 tons of concentrates and produced 2711 tons of calcines.

One kind of concentrate was treated, yielding a uniform calcine.

Our costs for roasting are of little value [do not represent an average] on account of the shortness of the period.

Why the plural? He is referring to the total expense, not to the several items.

Extensive tracts of alluvials

He meant "an extensive tract of alluvial ground", but thought it grander to use two plurals.

These estates contain important deposits of iron ore as well as gold and copper ores.

Only one deposit of iron ore—hematite—was known to exist; the plural is misleading. The property consisted of one consolidated group of mining claims, therefore 'estates' is merely a sample of careless magniloquence.

A professor writes concerning the treatment of quicksilver "ores" by flotation. He had in mind the one important ore of quicksilver, that containing cinnabar, and was not referring to those containing native mercury, electrum, or meta-cinnabarite.

Moreover, in discussing a metallurgical process, he would have been more explicit if he had referred to the mineral itself (cinnabar), which was to be separated from the gangue by flotation.

His present whereabouts **are** unknown.

This appears as a foot-note in the 'Atlantic Monthly'. The use of the plural verb suggests that he may be in several places at the same moment. The editor does not know the particular place where the person happens to be, and the use of the singular verb would convey the correct idea without puzzling the reader further. 'Whereabouts' is not a true plural, but merely a variant of 'whereabout'. It will be better to avoid the use of the passive voice, and say:

"The editor does not know his present whereabouts."

The choice between singular and plural is a matter of haphazard to many writers. For instance, the words 'United States', 'Government', 'Cabinet', 'committee', 'company', and 'management' are given a plural verb more often than the singular. Sometimes both are used in the same context. The American Ambassador to the Court of St. James, in transmitting a diplomatic note from Washington to the British Government under date of December 28, 1914, used the plural and the singular indifferently after 'Government', thus:

The Government of the United States **have** viewed

The Government **has** so often exhibited

The British Government **were** satisfied

This Government **is** forced

The Government of the United States **do** not intend

This Government **is** informed

The Government of the United States **are** informed

The Government **believes**

It is correct to say: "The United States *is* a great country"; also "These United States *have* increased in number since the Civil War". The United States is a political entity. The Government *is* a unit. The members of it *are* united for purposes of national administration. The Cabinet *is* a select

committee of the party in political control; the politicians in the Cabinet *are* men of various aptitudes. We say, "The company *is* about to buy another mine", if this refers to the act of a corporation. So, likewise, "The management *was* highly respected", and "The committee *consists* of nine persons". In such nominatives the collective sense is implicit and the use of the singular verb makes it clear that the writer is speaking of collective action or unified decision. If not, the plural becomes necessary; thus, "The members of the committee *were* unable to agree" is better than "the committee *was* not agreed".

The choice between the singular and the plural verb after a subject containing numerals is likely to perplex the technical writer. Thus, he will say either "Fully 1000 tons of ore *was* crushed" or "Fully 1000 tons of ore *were* crushed". The phrase "1000 tons of ore" signifies a quantity considered as a unit, not the separate tons, therefore the verb should be in the singular. It is correct to say:

5000 oz. of gold was produced.

\$40 was collected.

Three feet was then cut off the pipe.

Twenty years is a long time.

Forty yards is too far.

Twice two is four.

Two-thirds has been lost.

All the above are sanctioned by good usage. We say "1000 tons was crushed" because the idea 'of ore' is implicit and we are thinking of the tonnage in mass and not of a thousand separate tons. Such a locution refers to an amount in weight and not to separate things. On the other hand, we might say: "Five tons *was* tested in one-ton lots"; but it is preferable to say: "Five one-ton lots *were* tested". Again, in "Forty barrels of oil *was* stored in the tank" the quantity measure in barrels is regarded as a unit; whereas in "Forty barrels of oil *were* stored in the warehouse" the verb may be plural if the

oil is contained in 40 separate barrels meant to be considered individually.

11 cc. of iodine solution **were** [was] used to titrate.

Here the use of 'was' seems inconsistent with a rule of grammar, but it is consistent with the idea, namely, that iodine to the amount of 11 cc. was used in the titration. In such statements the idea of quantity is implicit, thus:

An 11-cc. quantity (or volume) of iodine solution was used.

A 100-ton quantity (or weight) of ore was crushed.

The idea of quantity being implicit, the word for quantity is omitted, and we have the adjectival phrase alone remaining as the apparent subject.

Two nouns may indicate one subject, thus:

A block and tackle is employed.

Collective nouns are joined to plural verbs when the statement is meant to apply to the individuals of a group, thus:

The people **are** one and they have one language.

The public **have** various opinions.

It is true, concord requires that a verb shall agree in number with its subject, yet when meaning is in conflict with form, it is well to allow logical considerations to prevail over the grammatical; that is why a collective noun, though singular in form, calls for a verb in the plural when the reference is to the separate units, not to the aggregate.

This view of the matter is stretched by some writers to sanction such phrases as:

The Smith & Jones Co. **have** built a new mill.

The management **have** refused to raise wages.

Such usage is not to be commended, because the building of a mill or the raising of wages is an act directed by the 'company' or the 'management' as a unit, not by the various members as individuals.

V. SUPERLATIVES AND THE SUPERFLUOUS

The purposes of composition are various; one purpose, for instance, is to make a record for the writer's own use, as in a diary. That does not involve responsibility to others. There is also the writing meant to influence opinion—to be persuasive and pleasing. With such writing we need not concern ourselves at this stage of our study. The prime purpose of technical writing is to be informative—to convey information; therefore it must be clear beyond the chance of misunderstanding.

Such clearness is impossible if meaningless or ill chosen words are sprinkled through the text. Discard the trivial phrases that are constantly at your elbow. Brush aside a host of vapid superlatives. Metternich exclaimed: "The superlative is the mark of fools". It is a false emphasis, like the underlining in a school-girl's letter. For example, the little word 'very' can be deleted nine times out of ten; it is an impediment to terse and perspicuous writing, as the multitudinous hand-baggage of the British tourist is to his travel. 'Very' supposes comparison. A mine with a 1000-ft. shaft is *very* deep to the scribe who writes from the Joplin district, in Missouri, but it seems a shallow hole to a man living at Calumet, Michigan. A vein that is 10 feet across may be considered *very* wide at Cripple Creek, Colorado, but it is only a 'stringer' to the miner at the Homestake, in South Dakota. Ore assaying \$20 in gold is *very* rich at Juneau, Alaska, where 16,000 tons of \$1 ore is crushed daily, but it is relatively low-grade to the pocket-miner at Alleghany, in California. It is all a matter of comparison; unless the reader knows your standards of depth, width, or richness, your 'very' has no significance.

"Where erosion was *very* rapid or oxidation *very* shallow"

is a statement that immediately raises the question: What is the writer's scale of rapidity or shallowness?

Sir Arthur Conan Doyle says:

It is **certain** that the Germans were **very** outclassed upon the three days of June **which** I allude to.

The "certain" and the "very" suggest exaggeration. An adverb, such as 'greatly', has been omitted before "outclassed". He misplaced "to"; for he meant "the three days in June to which I allude".

After William T. Tilden had won the world's championship in tennis at Wimbledon, a writer in the London 'Times' remarked:

Tilden is a **very** good player **indeed**.

Cela va sans dire. One can hardly imagine a more unnecessary remark apropos of that subject at that place and at that time. It was as much to the point as it would be to say that bread is excellent food or that Shakespeare was a skilful writer.

The use of 'very' may defeat its purpose. Some words, like 'perfect' and 'unique', can not be qualified. If a thing be 'perfect', a 'very' can not make it more so. To say that a machine "makes a *very* perfect separation of the slime from the sand" is tantamount to saying that it makes an "almost perfect", which is an 'imperfect', separation. A perfect separation is 100%, which is the limit to that kind of perfection.

'Unique' is a word that is immune from qualification.

The manager of the Mount Boppy refers to **one of the most unique** sections of the mine.

Here the superlatives smother each other. If several such "sections" existed in the mine, not one of them was unique. The one first disclosed may have been unique; the second killed the uniqueness of it.

A **rather** unique suggestion

A **very** unique tool is illustrated in Fig. 10.

The process is **somewhat** unique.

A **very** unique child, said I.

Each of these four quotations contains a superfluous adverb.

If a thing be unique, that sufficeth. Similarly, such words as 'obvious', 'vertical', 'straight', 'moral', and 'honest' are not intensified by using an adverb; they are weakened. "A *very* vertical shaft" and "a *perfectly* straight adit" suggest the gilding of refined gold.

The vein is **very** vertical.

Constructing a tramway in a **perfectly** straight line . . .

A straight line is the perfection of straightness.

It is **very** obvious that the mine is worth the price asked.

It is obvious or it is not; it can neither be more obvious nor almost obvious. From the unnecessary emphasis one may suspect that it was not at all obvious that the mine was worth the price.

This reagent is **very** inexpensive.

A thing that is "very inexpensive" should be gratuitous.

The present-day prospector will be **entirely** extinct if the new mining law is passed.

To be 'extinct' is to be 'quenched' or 'extinguished'; it is a word that can not be intensified, that is, it is strongest when standing alone.

Gun-cotton is pressed into the requisite form in a wet state, in which condition it is **very** safe to handle.

The "very" weakens "safe", because the over-emphasis raises a doubt.

This scraper does not work **very** well in coarse material.

Probably he meant that it worked badly in such material.

Lord Roberts is a **very** honest man.

So said the 'Westminster Gazette'. This suggests that perhaps politically his honesty was considered not above suspicion.

Charles E. Hughes is **exceedingly** honest, **extremely** moral, but not **in the least** progressive.

Here the superlatives sap the strength of the sentence, and reduce it to mere verbiage.

The formation of the insoluble lime tungstate is **very** rare and has only been observed in one or two instances.

This statement is weakened by false emphasis. "The formation of the insoluble tungstate of lime is rare." That tells the story.*

These remarks do not refer to idiomatic phrases such as: "In *very* truth, he is a man". Idiomatic phrases are a law unto themselves. Here 'very' is an adjective; as also in "the *very* roots of human life". 'Very' makes a strong adjective, but a weak adverb. I would add this: If you employ 'very' infrequently, you will find it very useful on occasion.

He uses a solution of about 2% cyanide, which is **perhaps** sufficiently strong.

This does not provoke confidence in the accuracy of the writer's metallurgical method; evidently he ought to make some experiments with a view to removing his own doubts concerning the right proportion of cyanide.

It required only a **very limited number of** [few] bulkheads to complete the reservoir.

If he knows what he is talking about, he ought to state the number; what he says is that a 'few' were needed, but other engineers might have different ideas as to the fewness.

'Limited' is used carelessly as a synonym for 'small', 'scant', and 'slight'.

He has a **limited** [an insufficient] knowledge of cyanidation.

* It is customary to write 'lime tungstate', but as the insolubility refers to the tungstate rather than to the lime, I have written "tungstate of lime".

Anybody's knowledge of anything is limited.

The fire-wood was bought at the **limited** [low] price of \$4 per cord.

He based his confidence on a **limited** [slight] acquaintance with the standard textbooks.

Even a word like 'great' has little meaning if worked to death. A newspaper reporter, describing the submarine 'Deutschland', said:

The **great** hull has been pressed out of one sheet of steel. The only break in the smooth contour is at the bow where her **great** anchors hang. But even here it is hardly a break, for the anchors fit snugly into **great** pockets that still maintain the roundness of the hull. The conning tower rises like the hump of a camel in the **great** boat's back.

The Patent department is one of **great** national importance.

If it be of "national" importance, it must be "great". The significant word is "national", and the attaching of "great" belittles it.

'Small' is over-worked as well as 'great'; for example:

When a **small** particle of gold is ejected from the mortar-box of a stamp-mill . . .

By mixing a few **small** particles of clean gold with some **small** particles of quartz . . .

A 'particle' is a minute portion of matter, the termination '-icle' or '-cule' (as in 'animalcule') representing the Latin diminutive '-cula'. The only way further to indicate the minuteness of the particle is to state the size of it; "small" adds nothing to the meaning.

The same criticism applies to "fine" in the following:

A **fine** slime that is thickened in Dorr classifiers . . .

'Most' is another word much over-worked and likely to hinder the flow of thought, as water is retarded by a riffle.

The ore deposit is **most** extraordinary.

This can be done **most** effectually in one way only.

In both quotations the 'most' should be deleted.

'Doubtless', 'without doubt', and 'undoubtedly' are inter-

jected in a careless way as an equivalent for 'perhaps' or 'probably', instead of being held to their true significance.

Doubtless the vein will persist in depth.

The men, **without doubt**, are honest in their intentions, but their methods are most objectionable.

'Certain' is a word of uncertain meaning.

A **certain** kind of oil is necessary in the flotation process.

Here 'certain' is used as a synonym for 'specific', but it would be better to specify what kind of oil is required. Delete 'certain' and state whether it be pine-oil, wood-cresote, or olive-oil, for example.

These gates are opened to a width giving a **certain** [fixed or uniform] number of tons per hour.

Tuberculosis occurs to a **certain** extent among the miners.

In this example 'certain' either means nothing or it implies uncertainty.

There is a tendency to limit the profit to a **certain** [fixed] percentage of the capital employed.

To keep the cost **within certain limits** [to a fixed limit] . . .

Avoid the habitual use of 'certain', so that when you do employ it there will be no uncertainty as to your meaning.

'Certainly', like its corresponding adjective, is another bluff word; fuller of sound than of significance. Here is a quotation from the New York 'Annalist':

Certainly, Dr. Jastrow's article is stimulating to thought and can be read with interest by British bankers, remarks this authority. But one finds few to accept his conclusions as a whole. **Certainly** American banking enterprise is finding an outlet in South America; **certainly**, also, America's new banking system should help New York to take an increasing share in international finance; **certainly**, also, British banks in South America will need all their skill and energy in the future.

These four 'certainlys', one of which might be emphatic whereas the four cancel one another, are like the coughs of a self-conscious speaker. The addition, twice, of 'also' increases the clumsiness of the performance.

'Considerable' is a woolly word, usually out of place in a technical statement.

Considerable [numerous] data of this kind are given by Lewis and Shorter.

Considerable [deep] oxidation explains the absence of sulphides.

A **considerable** amount of ore was sent to custom-mills before the company built its own mill.

Some, even approximate, figure should replace "considerable", which depends for its value upon the writer's—and the reader's—notion of what is a large tonnage.

The plans for a plant of any **considerable** magnitude are not warranted.

Delete "considerable", and substitute a phrase that is more specific. Is it the cost that is the obstacle or the lack of sufficient ore? Then write either "The plans for an expensive plant are not warranted by the funds available" or "The plans for a plant of large capacity are not warranted by the tonnage of ore assured".

'Some', like 'considerable', is used in a loose, and usually meaningless, way.

Scotland produced **some** 3,500,000 tons of oil-shale.

This mine has yielded **some** 100,000 oz. of gold.

This process has met with **some considerable** success in the treatment of antimonial gold ores.

In two of these quotations "some" is redundant; it means 'about' or 'approximately', and that is suggested sufficiently by the round figures. The last one is so woolly in texture as to be ludicrous.

'More or less' is another phrase it is well to discard in technical writing, which aims to be precise.

The ore has been subjected to **more or less** oxidation.

The workmen are **more or less** inclined to resent the order.

Delete 'more or less' in these examples.

The application of **more or less** complicated formulas is superfluous.

The impression that the bases of calculation are **more or less** certain-ties [safe].

'More or less' is rarely needed, least of all in a discussion of accurate methods of appraisal.

Leaving no record other than scanty ruins, more or less perfectly [partly] entombed in the drifting sand-dunes [sand].

Do not imagine that the interlarding of qualifying phrases like 'more or less', 'to a greater or less extent', or even adverbs like 'about' and 'approximately', adds to the accuracy of your information or to the precision of your statement.

Crystals penetrated to a greater or less extent the substance of rock fragments.

The spaces between have been more or less completely filled by cementing materials.

Ore-shoots are likely to be associated to a greater or less degree with fissures.

These three quotations come from the same technical article, written by a geologist who mistook the decoration for the substance of scientific truth.

'Approximate' and 'approximately' are used too often as an elegant variation from 'about'.

He is approximately ninety years old.

The "ninety" is an evident approximation.

The mine is approximately six miles from the town.

The approximate distance is about four miles.

The "four" is an approximation, otherwise a fraction would be used, such as $3\frac{3}{4}$ or $4\frac{1}{4}$. The distance will depend on the road one takes; moreover, in practical life, the exact distance is less important than the condition of the road; a four-mile haul over a good road is less expensive than a two-mile haul over a bad one. Be accurate; do not affect it.

'Probably', 'perhaps', 'about', and 'rather' are sprinkled in the sentences of engineers with the idea apparently of indicating carefulness of statement, but care is shown better by precision than by studied moderation of language.

A sampling plant was built perhaps five years ago.

Ascertain when the plant was built and give the date.

The lode is **probably about** ten feet wide.

Measure the lode and give its average width, as well as you can. All such averages are subject to a reasonable discount; the insertion of 'probably' and 'about' will not avail if the average width of the lode should prove to be six feet.

'Quite' is used as a synonym for 'very', when 'very' would be superfluous; it is also used as a moderator, like 'somewhat' and 'rather'. Our British friends use it lavishly:

The mine is said to be **quite** rich.

The manager is reported to be **quite** a competent man.

The pump operates **quite** well enough for the purpose.

In all of these "quite" is redundant. If used at all, it should be employed in its true sense of 'completely', 'entirely', 'to the utmost extent', 'nothing short of', 'absolutely', as in:

The evidence is quite conclusive.

The building of the mill was not quite finished.

This was a fine clay quite free from sand.

'Rather' is another ineffective word when used as an adverb.

The quartz is **rather** hard and the walls are **very** straight.

Delete the words indicated. Likewise in the two following quotations:

The movement of minerals shows a **rather** remarkable concentration.

This is **more** especially true of the smaller veins.

'Present' and 'presence' are usually redundant; so are 'found to be' and 'known to be'.

The metallic minerals **present** in the ore . . .

The presence of other sulphides **was** [were] noted in this ore.

In most of these veins lead is the most important mineral **present**.

The refractory minerals, **when present**, are barite and sphalerite.

The formation, **where present**, **varies** [ranges] from a few [feet] to 200 ft. **thick** [in thickness].

The sandstone is **known to be** jointed in places.

In this region the deposits are **found to be** low-grade.

The limestone is **found** exposed on the western slope.

In the foregoing seven examples the words in **bold-face type** [*sic*] are superfluous. On the other hand, as Mr. Wood points out,* such phrases may be omitted improperly where they are required to complete the sense of a statement, as in:

The rich ore, when examined closely, **consists** [is seen to consist] of fine-grained drusy quartz.

Under the microscope the grains of sand are [seen to be] completely coated with iron.

‘Occur’ is a vapid word.

Alluvial deposits **occurring** at the bottom of valleys are always worked in this way.

The bottom of a valley is a logical place for an alluvial deposit. Delete “occurring”.

This phenomenon **occurring** within the atom is not affected by any chemical or physical agencies that have yet been applied from without.

A ‘phenomenon’ is an appearance; it is seen or detected by sight. Substitute ‘as observed’ for “occurring”.

Local economic conditions were favorable for a strike to occur.

Delete “to occur”.

The section of the mine in which the fire **occurred** was principally worked by top-slicing.

“The part of the mine on fire was worked principally by top-slicing.”

‘The fact that’ is employed by sundry writers for the purpose, apparently, of adding to the impressiveness of their remarks.

Notwithstanding [although] the fact that its resonant din was not permitted within the walls of Solomon’s temple, this humble tool was indispensably [?] associated with some of the noblest works of antiquity.

He is referring to the hammer.

Due to the fact that the ore is considered high-grade [; therefore] it is not proposed to build a concentrating mill.

* ‘Suggestions to Authors’, by George McLane Wood, p. 86.

Delete the first five words and insert 'therefore' as shown, or re-arrange thus: "Owing to the high grade of the ore it will be unnecessary to concentrate before smelting".

The lack of machinery in Mexico made necessary the use of other forms of power—man-power and mule-power.

The "powers" after "man" and "mule" are redundant; they detract from the simplicity and force of the statement.

The recovery was from 80% to 90% of the gold contents of [in] the slime.

Sundry colloquial phrases, of a childish character, are allowed to creep into serious writing.

Living as he did in Glasgow, he understood the Scotch.

Other important outbreaks were the several fires which took place in the Holbrook mine.

These mines are noted for the pioneer work in [the] electrolytic production of zinc done there.

The work of fire-fighting is rendered hazardous owing to [by] the large amount of caving and air-blasts which take place.

The reason that they do not is because of the tacit agreement observed by the members of the union.

The lack of space led to the substitution of boxes for barrels where the latter had been generally used.

Delete the words indicated.

How could one substitute boxes for barrels if barrels had not been in use?

'Et cetera' or 'etc.' is improper after 'for example', or 'such as'.

The ore contains various sulphides, such as galena, blende, pyrrhotite, etc.

Delete "etc." and insert 'and' before "pyrrhotite".

After the copper sulphides, such as chalcocite and chalcopyrite, etc., are reduced to a fine state of comminution . . .

The "etc." is not wanted. He had in mind these two sulphides, and no others. The "etc." suggests that he had something up his sleeve.

This silly little abbreviation is also used to round a statement or to make it seem more inclusive, thus:

Telluride ore is found in the Contention, Old Judge, Telegraph, Sarah Jane, etc.

He had mentioned all the mines in which, so far as he knew, telluride ore had been found. The "etc." was a mere flourish. It reminds one of items in the social column of a local newspaper, such as:

Mrs. Ebenezer J. Judkins gave an elegant dinner party, her guests being Mr. and Mrs. Algernon H. Smith, Mr. and Mrs. Adams Wheelock Brown, and others.

No one else was present, but it sounded fine and large to add "and others".

. . . depending upon the season of the year [and] time of day, etc.

Deposits of this type occur in several mines, for example, the Telegraph, Commerical, [and] Old Jordan, etc.

The gangue consisted of quartz, etc. [and other minerals].

Here "etc." is used merely to hide sloth or ignorance.

The last example might be changed to: "The gangue consisted chiefly of quartz."

Sir Clifford Allbutt writes:* "I do not say that 'etc.' is not to be used, but its use should be rare, and chiefly for the omission of parts of quotations and the like. When used by the author to eke out his own matter or to save himself trouble, the reader is disposed to exclaim, 'If you have anything more to say, pray say it; if not, finish your sentence properly; 'etc.' conveys no meaning at all'".

The assay-results showed discrepancies; of course, some of these were inevitable, because in an ore of this kind it is unlikely, of course, that a uniform average would be shown.

'Of course' is a literary hiccup. Speakers use it when striving to gain time in their search for an idea. It should be used sparingly in serious writing.

* 'Notes on the Composition of Scientific Papers', second edition, pp. 158-159.

'However', 'therefore', 'nevertheless', 'moreover', and similar adverbial connectives should be used sparingly. They are better placed parenthetically within the sentence than at the beginning.

However, the ore is more refractory than was supposed.

"The ore however is more refractory than was supposed."

Therefore it is impossible to come to any other conclusion.

"It is impossible therefore to come to any other conclusion."

The British have a way of disarming criticism by using qualifying words and phrases like 'somewhat', 'on the whole', 'be this as it may', 'we venture to conclude'. Gracious as these may be in some forms of expression they should be excluded from technical writing, which is best when most explicit and least upholstered.

The working costs have not been abnormally high, running, as they have done, only a trifle in excess of the average of the whole of the Witwatersrand.

The statement is meant to disarm criticism by its gentle verbiage.

A somewhat important development is announced from El Oro. It is rather rare to see such a rich vein.

This "orgy of moderation", as it has been termed, is almost a disease among our British friends; it has grown from their love for "the emphasis of under-statement", as Thomas Hardy calls it. British technical writers appear to shy at plain statements of fact as if it were bad form to be explicit. This fault, however, is not unknown in America. The editor of the 'Saturday Evening Post' says:

That war, on the whole, lowers the morale of the personnel is possible.

He tries to give dignity to an obvious platitude by inserting a qualifying phrase.

The average run of ore contained about 30% silica, more or less.

He must have been decidedly uncertain about it, for he protects his 30% both fore and aft.

Many other examples of redundant * words and phrases can be cited, for the careless writer not only uses the wrong words, but seems unable to exclude a host of mere diluents, so that between the wrong and the superfluous it becomes as difficult to trace his meaning as to follow a mountain stream when it meanders through a morass.

In an area **which** [that] had **previously** been stoped . . .

It could not have been been stoped otherwise than "previously".

Throughout **the whole** of the Carboniferous period . . .

They are **both** alike.

This is like the common colloquial reference to "two twins".

The problem is a difficult **one**.

Equally **as well**

The rock is **of a** brown color.

The orebodies are **of a** large size.

The **color of the** blende is a yellowish brown.

At its base the formation lies in a remarkably even surface of granite.

This lies **on the south side of the line** of the fault.

"This lies south of the fault." As Mr. Wood, from whom I take several of my examples, says: † "Introductory phrases like 'It may be said that', 'It might be stated that', 'Concerning this matter it may be borne in mind that', 'In this connection the statement may be made that', 'With respect to the occurrence of these ores it has been found that', perhaps intended to 'break it gently' to the reader, are generally superfluous or can be replaced by single words, as in the following sentence: '*There can be little doubt that this is [doubtless] the*

* 'Redundant' is derived, through the French, from the Latin *redundare* to overflow.

† Op. cit., p. 89.

prolongation of a fault of *the same character as the one* [like that] already described'''.

Avoid tautology,* which means the saying of the same thing twice in different words.

He spoke in a **monotonous tone** [monotone].

Records were started with this **ultimate** end in view.

He cannot return home before the **final** completion of the mill.

To a literary person this is as nauseating as the spreading of jam on cake, and cream on top of both. Obviously the writers of the above excerpts did not know or realize that 'ultimate' comes from a Latin word meaning 'last', and that 'completion' carries the idea of finality.

Some things are understood from the terms employed; avoid redundancies such as

This oil will serve **equally** as well as oleic acid.

The railway should be finished in nine months **time**.

Three hours of **time** are required for the treatment.

During the summer **months** the machinery will be transported to the railway station or river port nearest the mine.

One might question "railway-station" and "river-port", because either 'railway' and 'river' or 'station' and 'port' might suffice, but I think the writer is justified in using his couples in order to make his meaning clear.

We have completed a **rather** unique shaft; the work was **practically** completed in a little more than five months **time**.

This reminds me of the miner who asked the waiter to bring him some of "that damned *fromage de Brie* cheese", and of a San Francisco newspaper proprietor who spoke of "the *tout ensemble* of the whole".

The mill is three miles **distant** from the mine.

The peak is 12,750 ft. **high** above sea-level.

It is best to use zinc sheets of two feet by three feet **in size**.

In the summer **time** the cost of hauling is reduced considerably.

The tunnel will cut the vein 128 metres below the outcrop **on the surface**.

* From the Greek *ταυτο*, same, and *λογος*, word.

An outcrop is essentially surficial.

In ordinary **quicksilver** amalgamation the flakes of platinum float on the surface.

An amalgam is an alloy of mercury with another metal; amalgamation involves the use of quicksilver. I am reminded of an announcement appearing in an evening paper, in which it was stated that the lady who had just become Duchess of Westminster had "one son, a boy"; and the Duke himself had "two daughters, both girls".

Joseph P. Tumulty in his Wilson book says:

I was **profoundly** and **deeply** disappointed at the apparent hesitant, uncertain attitude of the Governor-elect.

'Profoundly' and 'deeply' mean the same; one comes from the Latin and the other from Old English. As applied to "attitude", the two adjectives "hesitant" and "uncertain" mean much the same. All that he meant to say was:

"I was deeply disappointed at the apparent hesitation of the Governor-elect."

Another writer says:

There are other **adverse** conditions **militating** against the expansion of the industry.

To militate is to fight against a thing, which thing becomes an adversary, or the exponent of an adverse condition.

The rectangular **shaped** package

The teeth of files are **very** brittle and easily broken, especially when the files are new. For this reason files should not be **promiscuously** mixed with other tools.

The "very" is redundant and the "promiscuously" is tautological. 'Promiscuous' means of mixed composition; it comes from the Latin *miscere*, to mix.

Here are a few more examples of redundancy:

It is barely 40 years **ago** since the process was first introduced.
Moreover, too, we have reason to feel certain that . . .

Had another process been used, who knows but that the mines might not have paid dividends until today.

The figures are **absolutely** accurate.

They could not be more than "accurate".

Together with the bullion that some of the mines **actually** produced . . .

So firm was the foundation that no vibration **at all** could be noticed.

The "at all" merely raises a doubt; "methinks he doth protest too much".

When used alone it would give **just** as good results.

Here also the excess of emphasis is unconvincing.

Under such conditions it is **quite** impossible to obtain trustworthy results.

If it be "impossible", it cannot be done. "Quite" is a childish frill; it is used much by the British, particularly in conversation; it is not a literary adverb.

In Russia the infant mortality is **something** enormous.

The ship's rolling, as she burns the coals **out**, is **something** appalling.

The variation in the results **obtained** . . .

The most important improvement **made** was to adopt a second pulley.

Minor fluctuations are likely to **occur** in such a plant from time to time.

The short revolving furnace would permit a longer treatment **time** than could be obtained by the stack furnace alone.

The effect **was exactly** the opposite to that sought and expected.

Here are some tautologies:

England has had to budge from her position of splendid **but lonely** isolation.

These boats can be used either on the ocean or on **inland** lakes.

This was confirmed by the **surrounding** circumstances.

Circum means 'around'.

He enjoys the **universal** esteem of **all men**.

If Germany should **again** regain her liberty of action . . .

It **was frequently** his wont to ride to the mine before breakfast.

With the **consequent** result that the price fell rapidly . . .

All results are consequential.

To ensure effective leaching **treatment** . . .

This is an important consideration in cyanidation **treatment**.

Leaching is a method of treating an ore; so is cyanidation.

The minimum exit **opening** is three inches.

An exit is an opening or passage by which something goes out.

The arrival of an anniversary **date** in the life of such person . . .

An anniversary marks the yearly return of a given date.

In **calcareous** materials **lime** predominates.

“Calcareous” means ‘of, or containing, lime’.

These young men died that the dominion of right and reason should be more firmly established among men.

The comparative is weaker than the positive. If “more” be omitted, the statement has the ring of success; as it is, the suggestion is that “the dominion of right and reason” was *not* firmly established and that they died to support a tottering structure.

The secret of a vigorous style is the rejection of the superfluous word.

Permit me to quote Henry James again; he was addressing students—young women of the highest type—when he said: “I am asking you to take it from me, as the very moral of these remarks, that the way we say a thing, or fail to say it—fail to learn to say it—has an importance in life that it is impossible to overstate—a far-reaching importance, as the very hinge of the relation of man to man”.

Henry James spoke thus “in those days when his sentence was a straight young thing that could run where it liked, instead of a delicate creature swathed in relative clauses as an invalid in shawls”.*

* Rebecca West.

VI. IT, ONE, WHERE, WHILE, SINCE

Freeman, the English historian, said that he had learned from Macaulay "never to be afraid of using the same word or name over and over again if by that means anything could be added to clearness or force. Macaulay never goes on, like some writers, talking about 'the former' and 'the latter', 'he', 'she', 'it', and 'they', through clause after clause, while his reader has to look back to see which of several persons it is that is so darkly referred to". He might have learned also from Macaulay that a preposition makes a feeble ending for a serious statement.

How often do you hear 'the former' and 'the latter' in conversation? Good conversation is a guide not to be disdained. When you must use 'the latter', do not confuse it with 'the last'.

Cheap labor, cheap fuel, and cheap transport are essential, the **latter** [last] being particularly important in base-metal mining.

The apparatus may be used to determine such gases as hydrogen sulphide, chlorine, oxides of nitrogen and some others, as well as sulphur dioxide. In the case of the **latter** two, etc.

The two last mentioned are "sulphur dioxide" and "some others". He should have stated which two, and he should have avoided that wretched phrase "in the case of".

Pinning may be partly prevented by use of chalk, oil, or turpentine. The **latter** [last] is best.

"Partly prevented" is a poor phrase. 'Prevented' is a word that does not lend itself readily to modification. He means 'checked' or 'corrected'.

These steps are necessary to produce the gas, crude oil, and ammonia, the **latter** [last] of which is in solution in the water obtained **along** with the oil.

This refers to the distillation of oil from shale. "Along" should be deleted.

Sir Clifford Allbutt ridicules the false sense of tautology. As an example, he quotes:

In the first series the reaction was present on 37 occasions, in the second series it occurred 32 times, while in the third it was observed in 27 instances.

This should be: "In the first series the reaction was observed 37 times; in the second, 32 times; and in the third, 27 times". It might be better even to delete "times" in the second and third clauses.

Cobbett says: "The word 'it' is the greatest troubler that I know of in language. It is so small and so convenient that few are careful enough in using it. Writers seldom spare the word. Whenever they are at a loss for either a nominative or an objective to their sentence, they clap in an 'it'".

A liberal education is the aim of all true scholastic effort; but there is no complete agreement as to the necessary curriculum. After all it is the product of an ideal that transcends the curricula of the schools.

The "it" might refer to the "curriculum".

The cartridge has fuse attached to it and it is split before it is shoved up.

The first 'it' refers to the cartridge, the second to the fuse, and the third again to the cartridge.

About two years ago, when it was found necessary to erect a new school-building, it was thought by many that some attempt should be made to give instruction to those engaged in mining. It was decided, therefore, to establish a mining-school in connection with the high-school and it proved a success.

A medley of different 'its' in consecutive sentences, like the above, is undesirable; the mixture of the indefinite or impersonal 'it' (the first three in the example) with the concrete 'it' (the fourth, which appears to refer to the "mining-school") is confusing. The diction is faulty, not only because of this mixture, but because of the repetition of 'it'. The phrasing can be accepted as far as the word 'school-building', which

might be followed by "many thought that some attempt should be made to give instruction to those engaged in mining. A mining-school therefore was established in connection with the high-school and proved successful".

Such phrases as "it was found necessary" and "it was decided" are not objectionable, as expressing public necessity or public decision, but they should be used sparingly.

The ore is scattered through the formation, and it is difficult to follow.

Which was difficult to follow, the ore? the formation? If the ore, "it" is unnecessary; if the formation, "and it" should be replaced by 'which'.

The air-compressor also operates the sinking-pump, so that it is an economical machine.

Was it the pump or the compressor that proved economical?

The fire at the Champion mine made it necessary for the company to shut-down its mill, and it is probable that it will remain idle for several months, until it is in a position to produce the usual supply of ore.

Here are five 'its', three of which appear to represent concrete things. Does the fourth refer to the company, the mill, or the mine? The fifth 'it' may refer either to the mine or to the company. As an alternative I suggest:

"The fire at the Champion mine compelled the company to shut-down the mill, which will remain idle for several months or until sufficient ore can be supplied."

The thickness of the **strata** [stratum] described as chalk by the driller is much greater in the southern field and it rests, in four cases out of five, directly on sand.

What rests? "The southern field"? No, the chalk. The 'and' can be replaced by 'where'; and 'chalk' had better be repeated instead of using the confusing 'it'.

It will make it possible for the engineer class of the country to act as a **unity** [unit] and therefore effectively, instead of as individuals, and therefore ineffectively.

The entire statement is ineffective. The first "it" can be replaced by "this". It will be better to re-write, thus:

"This will enable the engineers of the country to act as a unit, effectively, whereas in the past they have acted as individuals, ineffectively."

Do not hesitate to repeat a word in order to make yourself clear. Perspicuity is the better part of elegance.

For reasons that need not be discussed, a solute that lowers the **surface-tension** of a liquid concentrates at the **surface** of the solution, but this process of concentration, called 'adsorption', takes a certain definite time to reach its full value. Now, if a film of the solution is stretched, a new **surface** is produced and this new **surface** at the moment of production possesses greater **surface-tension** than the rest of the **surface**, because the **surface-adsorption** has not had time to reach its full value.

In this paragraph the writer has used the word 'surface' repeatedly in order to make himself clear. He is discussing a particular force, surface-tension, and avoids the risk of misunderstanding by giving it in full again and again. He might have used 'tension' without the adjectival 'surface' after "possesses greater", and he might have omitted 'surface' before 'adsorption' near the close of the paragraph; but if he erred, he erred on the right side. He is dealing throughout with essentially surficial phenomena, and he emphasizes the fact. For that reason the repetition is to be commended.

Please do not weigh the value of my admonitions entirely by the manner in which they are conveyed to you. I have read a sufficient number of books on grammar, composition, and writing to know that the exponents of these subjects—some of them far better equipped than I—commit many of the errors against which they warn their readers. My position is much like that of the honest, but bibulous, clergyman who told his congregation: "Do as I say, not as I do".

'When' is an adverb of time and 'where' is an adverb of place, yet one is not infrequently used instead of the other.

The vein was richest **when** [where] it was most oxidized.

When [where] the lode is widest it is 15 feet from wall to wall.

The other extreme is met with in those cases **where** the material is **very** heterogeneous.

This is jargon. I suggest:

"The other extreme is presented when the material is heterogeneous."

These formulas are applicable to **the case where** [when] one concentrate only is being made.

A large part of their time is devoted to interviews **where** [during which] they come in contact with new personalities and new ideas.

I have come across several instances **where** [in which] the presence of zinc was detrimental.

I could mention many specific instances **where** [in which] optimism of this kind has been justified.

Any business **where** [in which] the element of chance is unavoidable . . .

Mr. Tucker quotes from an English novel **where** [in which] a peer of the realm speaks . . .

Then in **the case where** a single metal is saved in a single concentrate . . .

Delete "the" and "where".

There are many **instances where** these machines could be introduced to advantage.

He means "places where" or "instances in which" they could be introduced.

The ideal shipment is one **where** [in which] all of the packages can be of the same size and form.

It might be well to say:

"The ideal shipment is one composed of packages of the same size and form."

When the percentage of copper diminished to a point **where** [at which] the ores could not be profitably smelted . . .

This is full of errors.

"When the copper content diminished so that the ore could not be smelted profitably . . ."

'While' means 'during the time that' or 'for as long as'. It is a mistake to use it for other purposes.

The orebearing sandstones, which dip eastward, are locally termed 'vetas,' **while** [whereas] those dipping westward are known as 'ramos'.

The reference is not to time but to the direction of dip. It is well when using foreign terms, such as the Spanish words in the above quotation, to insert the English equivalent in parentheses, thus 'vetas' (veins) and 'ramos' (branches).

The same writer misuses his prepositions:

These beds of sandstone have been found to contain ore at [to] a depth of over 1600 ft.

He did not mean that they were ore-bearing only at 1600 ft., but that they continued to be ore-bearing down to 1600 feet.

Enormous quantities of agricultural waste from the farms are disregarded, **while** [although] they contain elements from which valuable substances can be derived.

'While' is used frequently to indicate antithesis or contrast, but this usage is 'journalese' and easily becomes meaningless.

While especially suitable for fertilizer purposes, these potassium salts may be refined or brought into such form as the market may demand. **While** it is not true of the cement industry, it may be said of others that such methods of precipitation of dust from fumes have **shown** [yielded] phenomenal profits, not **alone** [only] because the device performs its functions efficiently, but . . .

I suggest: "These potassium salts, although of special value as fertilizers, may be refined or otherwise adapted for other purposes. Such a method of precipitating dust from fume in other industries has yielded extraordinary profits, and it is possible that a similar result may follow the utilization of this by-product of the cement industry, not only because the device . . ."

It cannot be contended that it is more profitable to engage non-union men at higher wages; **while** if the company wishes to discourage the union, why not cease operations entirely for a time?

"While" can be deleted.

The editor's article on the tariff question and that of Mr. Parsons on the Engels mine will repay careful reading; **while** [and] when Mr. Allen writes on cyanidation, and Mr. Hyde on flotation, their contributions must be regarded as authoritative.

The fireman was killed on the spot, and the engineer was slightly injured; **while** the line was blocked for some time by the wreckage of the freight train.

In the three preceding examples, "while" is a feeble and unnecessary connective.

The speculative value of an idle mine depends upon the anticipation of a resumption of profitable activity; **while** it is idle it is not a profitable asset and it should not be appraised as such by the County Assessor.

Here 'while' is used correctly. Sir Clifford Allbutt remarks* that many of his candidates for a medical degree "are content with one conjunction—'while', which is used indiscriminately for 'and', 'since', 'although', 'whereas', 'notwithstanding', 'nevertheless', and 'yet'". Mr. Wood complains that "the same lack of discrimination is shown by some writers in the Geological Survey". He proceeds to say:† "These writers learned in their schoolboy days that 'though' and 'yet' are proper correlative conjunctions, but in Survey manuscripts they correlate 'while' and 'yet'".

While [although] coal and oil command high prices, yet . . .

In this quotation the "while" does not refer to time.

While [although] this work has been started, it cannot be completed before winter.

Martin and Stanton devoted about two weeks to the general geologic problems **while** Stone spent about a month in studying the coal measures.

Thus, suggests Mr. Wood, it would appear as if time had passed more rapidly with Stone than with Martin and Stanton; or a month's work on the coal measures may equal only two weeks on general geologic problems.

In several of the Cretaceous formations they are among the most valuable diagnostic fossils, **while** [and] at a few localities they occur in great numbers.

At some places the vein is five feet wide, **while** at others it narrows to a mere thread.

* Op. cit., p. 98.

† Op. cit., p. 73.

Place a semicolon after "wide" and delete "while".

Man's methods are ever changing, while [whereas] Nature's laws are unvarying.

The two clauses emphasize a contrast.

The undersize is carried to the conveyor, while the oversize goes to an elevator . . .

The two operations are synchronous, it is true, but the intent is to draw attention to the division and divergence of the crushed ore; therefore delete "while" and substitute a semicolon for the comma.

On the same page of manuscript I found examples of the wrong and right use of 'while'.

I say "may" because the process must be first tried, for while [although] gold may float from one it may not float from another.

The machine has the advantage in that one portion may be used as a rougher while another section is cleaning.

While [although] the statement was general, it was based upon specific information.

In the head-line of a local newspaper I saw: "Horse dies while waiting for mail-order of oats". The order was sent by mail but reached its consignee, a grain merchant, five years late. In the meantime the horse died, not for lack of food, or of oats, more particularly, but just because horses have to die, like the rest of us, some day. The "while" is misleading.

'Although' is preferred at the beginning of a statement; 'though' is used to introduce short interjectory or supplementary clauses, as in

He is poor, though honest.

Although he is poor, he is neither uncomfortable nor unhappy.

'Since' is another little word that is put to improper use. Its proper function is to signify 'after a specified or implied time'.

An important operation which has been proceeding since [for] several days.

Since [as] the strike has upset the friendly relations so long maintained between the manager and the men . . .

These costs were low since [because] the mines were operated by slave labor.

I suggest: "Costs were low, the mines being operated by slave labor".

They did not work far below permanent underground water-level, since [because] no amount of human labor quite accomplishes the work of modern pumps.

Some years since [ago] I was placed in charge of a gold mine in California.

Since [as] my present occupation has to do directly with neither capitalist or [nor] prospector, possibly I may be allowed to look at the question judicially as it concerns [in its bearing upon] the mining business as a whole.

It makes a greater demand upon the reader's abilities since [because] it appeals to his power of comprehension rather than merely [to] his faculty of approaching facts.

Since Dogberry said it, we may be sure that Shakespeare thought otherwise.

This use of 'since' is recognized by the dictionary, but it is a secondary one, and not to be recommended. In the last quotation (from the first edition of this book) "since" should be replaced by 'because' or 'seeing that'.

'Than' appears to be a frequent cause of stumbling.

The preparation of pulverized fuel has been a problem in another field than that under discussion.

He means that it "has been a problem in a field other than that under discussion".

In regard to the revision of the mining law, Alaska may need something different than [from] the laws covering the States.

Probably the idea at the back of his head was "something more different than". Of this one can say as Robert Browning said of some of his writings, only the Deity and he knew what was meant, and of others of his writings even he, the poet, could not say what he had meant when he wrote them.

It **will** [may] be found that **in many cases** to do this requires an entirely different oil **than** [from] that which **had** [has] given satisfactory results in the laboratory.

"Oil" should precede "entirely"; "in many cases" is not wanted.

The conjunction 'that' is the cause of tripping.

It was shown **that**, in a slime plant where excessive dilution of the pulp was practised, [that] the precipitation of the gold in the zinc-boxes was exceptionally good.

The "that" should be moved as indicated, otherwise the connection between the first and last clauses is not made clear. It might be better to say: "It was shown that the precipitation of gold in the zinc-boxes was exceptionally good in a slime-plant in which excessive dilution was practised".

It is a common trick to take breath in the middle of a badly organized sentence by using a second or "resumptive" 'that', as the editors of 'The King's English' call it.

I mean the error of supposing that because there exists in language a name, **that** therefore there must exist in Nature something corresponding to the name.

Note that it is correct to write, as in the preceding example, "it was shown, in a slime plant . . .", omitting "that" after "shown", whereas it would not be permissible to drop the "that" after "the error of supposing", for the reason that "supposing" and "because" have to be joined or correlated by the "that". "Therefore" is a sufficient connective.

It has become a recognized idiom to drop 'that' in such phrases as

I presume you know

I assume you are willing

But you should take care not to omit 'that' when a long phrase or clause intervenes between it and the subject and verb it introduces.*

* 'The King's English', p. 356.

We notice in a leading article in your issue of today on the subject of the carriage of Australian mails you imply that the increased price demanded by the Orient Pacific Line was due to . . .

A 'that' ought to follow "mails".

I do not suppose in view of the many evidences of impoverishment in the neighboring mines you will be willing to start a new vertical shaft.

A 'that' is needed before "you".

'Thus' is a continuative, not an introductive; it should be used in sequel.

The public has no use for the Stock Exchange. Thus the markets, particularly the speculative ones, largely are in the hands of foreign operators. Thus Kaffirs and oil shares were dominated from Paris.

'Thus' means 'in this way' or 'in the way to be indicated'. In the above quotation the writer uses it to introduce statements intended to explain who has replaced the public in the share-dealings on the Exchange. Neither 'thus' is required. A semicolon should follow "operators". "Largely" should come after "are".

Another objectionable mannerism is the use of the indefinite pronoun 'one'. This is distinctly a British habit, but many Americans affect it, and, being common among well-bred people, it has a vogue against which a careful writer should be on his guard. In technical writing it is a plain nuisance.

One dined late, therefore one did not walk to the club until ten o'clock.

He meant to say: "I dined late, therefore I did not walk to the club until ten".

I am engaged in reciting the incidents in one's [my] life.

This is a panicky attempt to escape egotism.

The 'Westminster Gazette' says:

Then cricket will become a sport without nerves, and one of which one will willingly become a spectator.

Lord Rosebery remarks:

The less one says about a toast one knows nothing about the better for one's self and the audience.

Note also the preposition-verb and the misplaced preposition.

J. L. Garvin wrote recently in 'The Journal' of the Institute of Journalists as follows:

This you say is a talk by a journalist to journalists! So **one** had often declined. At last, in answer to the latest and most urgent invitation from French friends, **one** determined to go, and now the wonder seems that **one** did not go before.

He means that *he* had often declined to visit the front in France, until at last *he* determined to go and then wondered why *he* had not gone before. Substitute 'I' for "one" throughout. The statement is only interesting as referring to the ideas and movements of the speaker, the versatile editor of the 'Observer'. Note the awkward sound of 'one' in "wonder".

One had noticed that in Cornwall the miners had never been able to get rid of the influence of the smelters in selling their ore.

Again the mock-modest 'one' is associated with a preposition-verb. The observation is uninteresting unless backed by the personality of the observer. He might have said:

"I had noticed that the miners in Cornwall had been unable to escape the dominance of the smelters."

One used generally to prospect with a *cocoa-nut* [coco-nut] shell, and when **one** wanted to try a piece of ground on a bigger scale the thing would be to take down a tree, beat the bark off, spread it out, and use that as a launder. **One** would follow this by doing something else. **One** also came across very curious furnaces . . .

This is quoted from the Transactions of the Institution of Mining and Metallurgy. It is the rambling description of a modest man, shrinking from being too downright and avoiding even the semblance of pedantic accuracy; hence the fluffy texture of his verbiage. He was writing about prospecting in the Malay peninsula. His description has no scientific value unless it be the testimony of an eye-witness; being such, he ought to accept the responsibility and use the definitive 'I'.

In **one** instance **one** had anything but a positive discharge and a positive feed, whilst in the other, **one** had both of these points absolutely defined.

Note again the clash between the numeral "one" and the pronoun "one". This quotation, referring to heavy stamps, is also from the Transactions of the premier mining-engineering society of Great Britain. Part of the wearisome use of 'one' is due to the custom of reporting in the third person—the *oratio obliqua*. This is objectionable in matters of scientific testimony. A record in the first person is safer and more intelligible.

Whenever 'one' is used, it should be used consistently.

He is a man who speaks frankly and who gives **one** the impression that you are speaking to a man and not to a gramophone.

Here "you" should be 'one' or "one" should be 'you', for the sake of concord. He means: "... the impression that a man is speaking, not a gramophone".

There is much that **one** might imitate if only he [one] were safe in doing so.

One is disposed to avail **oneself** of what has been done by **his** [one's] predecessors.

One must not be too confident of **his** [one's] own success.

Another clumsy use of 'one' represents a redundancy, for it is unnecessary:

The present condition of Mexico is **the** normal **one** and the period of industrial development under Diaz was **the** abnormal **one**.

Delete the words indicated; also replace "and" with a semicolon, thereby making clear the opposition of ideas.

The ore is a refractory **one**, and **one** that will test the resources of the best metallurgists.

"The ore is refractory, and will test the skill of the best metallurgists."

The American uses 'they' as an indefinite pronoun, as if to compensate for abstaining from the use of 'one' *à l'Anglaise*.

It took thirty years to introduce oil flotation and **they** are now erecting a monument to the memory of the woman who **first** discovered the process.

'They' stands for the public or those interested in mining. 'First' is redundant.

To return to our indefinite pronoun: a technical writer is a scientific witness; his testimony is valuable because he vouches for the accuracy of it; if he hides his identity under the mock-modesty of the indefinite pronoun he contravenes the purpose that is supposed to prompt his utterance. To begin a statement in the first person may seem assertive, but it simply asserts the responsibility of the writer, identifies the witness, and places him on record as testifying to the fact. To begin with 'one' is to start under a cloud of impersonality, to evade responsibility, and to pose as a nebulous nonentity. In technology it is necessary sometimes to sacrifice elegance to precision; the writer on technical subjects is expected, not to pose, but to speak to the point without wasteful circumlocution or mincing affectation.

Some people seem to consider the first person positively indecent; they shun it. Of course, unnecessary egotism is objectionable, and the needless repetition of 'I' is a fault, but the intrusion of self into a matter that is personal, as testimony must be, does not come under the ban of good taste. On the other hand, the indefinite pronoun has its use, of course, when one desires to be impersonal. Thus "One may well be afraid when the lions roar" is a pleasant way of expressing the idea of fear without attributing timidity to any person in particular. "One is loath to impugn the President's motives" is a proper way of suggesting more than an individual questioning of his motives. Likewise when one is generalizing, the introduction of the ego may be unnecessary or even annoying; thus: "The training of mining men has usually been so broad that *I find* [one finds] them at home in almost any branch of military engineering". However, in technology the need of 'one' in such contexts does not arise often.

Some writers, in the desire to avoid egotism, employ the

editorial 'we' or refer to themselves as 'the writer' or 'the author'. The British, as we have seen, fall back upon the impersonal 'one', and revel in their mock-modesty. All this springs from a mistaken self-consciousness. In technical writing, it is best to use the first person singular throughout when making statements involving personal experience or personal responsibility; in other statements it is easy to avoid the intrusion of personality. 'Thermodynamics and Chemistry', by F. H. Macdougall, is a book that illustrates most of such blunders. In the preface one may read that "at best *the author* has been able only to sketch in the high lights and deep shadows of the picture . . . If *the writer* has indeed succeeded . . . the effort has not entirely been in vain". After mentioning two other books, he continues: "To both of these authors *the writer* is much indebted". Finally he says, "if *the author* should succeed". Throughout the book 'we' replaces 'I'. The style of the entire volume is exemplified by the first sentence in it:

In our every-day experience we describe bodies as hot or cold, basing our statements usually on the sensations we have when we bring our hands in contact with the objects considered.

Chapter IX begins:

In Chap. VII we learned that if any process takes place in an isolated system, the total entropy is increased or in the limiting case of a reversible process is unchanged. We can express this result symbolically as follows: [equation] In our study of actual processes, physical or chemical or both, we shall often have to deal with systems that are not isolated. Thus if we are studying a system in which a process takes place isothermically, it is evident that in general there must be an exchange of heat or work or both with the surroundings if the temperature of the system is to remain constant. The results obtained in Chap. VII can however be applied in such a case if we bear in mind that the system plus the surroundings make up an isolated system. Since our chief concern will be with the surroundings, we can without any serious loss of generality suppose that all changes in the surroundings take place reversibly.

He confuses himself with his readers, and both with mankind in general, by using 'we' for each and all. As Mark Twain

said, the only people entitled to use the first person plural are kings, editors, and persons afflicted with a tape-worm.

I have criticized two Britishisms, not out of ill-will, but for a definite purpose, and I have referred to one or two Americanisms in exactly the same spirit. To my mind Britishisms and Americanisms are equally objectionable; they are provincialisms detrimental to the currency of the English language, which is the common heritage of both peoples. The official language of the United States, a language that originated in Great Britain, is written in the same way by those who write it well on either side of the Atlantic. I can assure you that Mr. Eliot and Mr. Butler, for example, speak and write the same language as Mr. Asquith and Mr. Balfour; and if any of us speak or write differently from them, we may be using British or we may be using American, but we are not using English.

VII. THE SUBJUNCTIVE, SHALL AND WILL, AND THE POSSESSIVE

THE SUBJUNCTIVE

The use of the verb in this mood is not as common as formerly: at the time, for example, when the Bible was translated and the plays of Shakespeare were written. Nevertheless it is an essential part of literary English. In editing the 'Mining and Scientific Press' I do not insist upon the use of the subjunctive in articles that are contributed from the outside, but it is deemed proper in all our editorial writing. To speak plainly, the subjunctive is a mark of scholarship; it is ignored by those who are not particular in such matters, and unfortunately it is a source of perplexity to many who are entirely unfamiliar with the use of it. That is why, as an editor, I think it well to allow the indicative mood to be used by contributors in sentences in which, to be strictly correct, the verbs should be in the subjunctive mood. The fact that most subjunctives are indistinguishable in form from indicatives is another cause of trouble to the uninitiated.* For example, the verbs in such phrases as "Suffice it to say", "So help me God"; and "God save the King" are in the subjunctive. One reason why the subjunctive is becoming uncommon is the growing habit of expressing the subjunctive meaning by aid of auxiliary verbs that are coupled with the infinitive; thus: "It will suffice to say" and "May God save the King".

The subjunctive is common in subordinate clauses, and that is how it obtained its name, 'subjunctive', meaning

* The student is referred to 'A New English Grammar', by E. A. Sonnenschein, published by the Clarendon Press, Oxford. This textbook (see pp. 60-71 in Part III) discusses the subject luminously.

'subjunctive'. Thus it is used for the purpose of stating that something is to be done:

It is requested that every candidate **write** [=shall write] legibly, and that no one **leave** [=shall leave] the hall till an hour after the commencement of the examination.

Adverbial clauses expressing a supposition call for the subjunctive.

Come what may, I'll do it.

If I **were** a mining engineer, I would go to Mexico.

The use of the subjunctive to indicate an action in prospect, especially after 'until', may seem archaic:

Spare not thy spur until thou **come** to Winchester.

Today we would say:

"Do not spare the gasoline until you reach Los Angeles."

Here "reach" is in the subjunctive, although the average reader would be unaware of the fact.

We use the subjunctive to express what is proper, or what ought to be.

It is time that you **cease** from quarreling.

The order of the day is that every man **take** care of himself.

In the first of these two quotations the form of the verb does not mark the subjunctive, but in the second it does. One might say:

It is time that you **should cease** from quarreling.

The order of the day is that every man **is to take** care of himself.

These versions, however, would be less literate—in short, they would be couched in poorer English.

The past subjunctive is even more subtle; it is used to express what was to be done or what was to happen.

He urged that before any process **were chosen** the ore should be analyzed exhaustively.

The past subjunctive may be the equivalent of a present subjunctive.

It is time that the engineer **were consulted** on this matter.

Desire is expressed by the subjunctive.

See to it that you **be** ready.

Pray that God **defend** the right.

Remind him frequently, lest he **forget**.

I would I **were** the President.

The past subjunctive is used in suppositions as to the present, and the past-perfect subjunctive in suppositions as to the past:

Had we the capital, we would equip and operate the mine.

Had we but **known** that the price of silver was to rise, we would have continued at work.

The meaning of the subjunctive is not affected by adding a subordinating conjunction, as would commonly be done:

If we had the capital, we would equip the mine.

If we had known that the price of silver was to rise, we would have continued at work.

The present subjunctive is proper in stating a supposition:

It is a fault if the ball **fall** short or in the wrong court, or if it **pitch** on the top or above the side or back walls.

The perfect subjunctive is rare:

It is a fault if the ball **have fallen** short.

The subjunctive is used in dependent questions as to a matter of fact.

I wonder whether it **be** true.

I wondered if it **were** true.

To illustrate how a subjunctive in modern English by means of auxiliary **be** is formed, we will give the following:

Long live the King!

May the King live long!

If he had killed me, he **had done** a kinder deed.

If he had killed me, he **would have done** a kinder deed.

The order of the day is that every man **take care** of himself.

The order of the day is that every man **shall take care** of himself.

Deny it who can.

Let anyone **deny** it who can.

The authors of the 'King's English' say * of the subjunctive:

"These forms, with the single exception of 'were', are perishing so rapidly that an experienced word-actuary puts their expectation of life at one generation. As a matter of style they should be avoided, being certain to give a pretentious air when handled by anyone except the skilful and practised who need no advice from us . . . 'Were', however, is often right and almost necessary: other subjunctives are never necessary, often dangerous, and in most writers unpleasantly formal. The tyro had better eschew them."

With this dictum I agree in the main. Only the experienced writer, thoroughly versed in his craft, should undertake to play with the subtleties of the subjunctive. He can adopt other ways of expressing the same meaning. Attempts to use it by the illiterate only lead to blunders. Thus a Senator writes:

If it **were** [be] good policy to present the proposal in the open; if it **were** [be] good policy to accept that proposal in principle in the open, it is equally good policy to determine finally the whole subject matter in the open.

He is speaking of the Conference at Washington in November 1921.

It **might be a question open to discussion** [is questionable] whether Government tutelage is [be] advisable.

Even if the results **are** negative.

If the results are known to be negative, then "if" should be replaced by 'though'. If the results are not known yet, then

* Op cit., p. 157.

the subjunctive should be used, the "are" being replaced by 'be'.

'SHALL' AND 'WILL'

The idiomatic use of 'shall' and 'will' is a cause of perplexity to many writers, particularly the Scottish. Originally 'shall' and 'will' were the present tenses of two verbs; 'should' and 'would' were their pasts; one of them had the meaning of command or obligation; the other, of wish. In Old English there was no separate future.* It was natural therefore that "a future tense auxiliary should be developed out of these two verbs". 'Should' follows the same rules as 'shall', and 'would' as 'will'. When they retain their original meaning of command and of wish, respectively, both 'shall' and 'will' are used in all three persons, singular and plural.

Thou shalt not steal.

Shall I open the door?

You should not say that.

And shall this State so dishonor itself?

It should seem so.

I will have my way.

I will drown, and you shall not save me.

In plain statements about the future, the first person has 'shall', whereas the second and third persons have 'will'.

I shall be late.

You will be late.

We should have consented.

He would have consented.

It would have been better.

If he falls into the water, he will drown.

In statements that involve an expression of the speaker's intention to cause something to happen it is customary to use 'will' for the first person and 'shall' for the others.

I will tell you tomorrow.

You shall regret what you have done.

He shall have none of my money.

* 'The King's English', p. 134.

In "I would like", the speaker's mood is expressed by "like", so that "I should like" is considered to come under the rule that applies to a plain statement of futurity.

In speech and in informal writing the distinction between 'shall' and 'will' is marked by abbreviation—the use of 'll. Professor Bradley refers to this matter humorously: * "There can be little doubt that the use of this atonic 'll has been a very potent factor in bringing about the widespread use of *will* as the auxiliary of simple prediction for the first person. Grammarians have so long been in the habit of confining their attention to written or printed forms of speech and to fully pronounced words, as the only real entities in language, that they have been apt to regard as mere vulgarisms beneath their notice all such developments as this which we have been considering. While fighting desperately in front to prevent 'I will' from usurping the place of 'I shall' in simple prediction, they have entirely failed to see that their flank was being completely turned by *I'll*, which they had ignored".

In asking a question, the choice of 'shall' or 'will' is determined by the form of the expected answer:

"Shall you be there?" anticipates "Yes, I shall".

"Should you have known?" expects "Yes, I should (or ought)".

"Should you like a bath?" is followed by "Yes, I should", or "No, I should not".

Will [Shall] you be likely to see the superintendent?

When a Harvard professor posted a notice saying, "I *will* be unable to meet my classes this week", it indicated either that his inability to do his work was a matter of his own volition or that he was unable to speak correct English.

At a conference President Harding said:

If we fail today, we **will** try again tomorrow.

* 'Shall and Will—An Historical Study', by Cornelius B. Bradley, Proc. Am. Phil. Ass., 1912.

The use of 'will' implied a definite voluntary purpose, which was what he meant; but he proceeded to say:

We **will** [shall] thus be able to mitigate these periods of depression.

His volition obviously could not determine his ability to produce the desired result; he was making a statement of futurity only, and this calls for the use of 'shall'.

W. Herbert Fowler, in an advertisement, says:

I **will** [shall] be pleased to receive your inquiries relative to golf-course architecture.

A professor remarks:

Let us then imagine the time to have arrived when Americans **shall** [will] no longer be able to understand the works of Milton.

If we think right we **will** [shall] feel right.

THE POSSESSIVE CASE

This grammatical inflection is used too much, and carelessly. The possessive absolute should not be used as attributive to a noun that follows.

I feel sure that **yours** and my efforts will be successful.

The correct form is "your efforts and mine".

He attributes the success to **theirs**, as well as his own efforts.

Here it should be "to their efforts as well as to his own" or "to their efforts and his".

These examples I have paraphrased from 'The King's English', the authors of which say, advisedly: "It must always be remembered in this as in other constructions that the choice is not between a well-sounding blunder and an ill-sounding correctness, but between an ill- and a well-sounding correctness. The blunder should be ruled out, and if the first form of the correct construction that presents itself does not sound well, another way of putting it must be looked for; patience will always find it. The flexibility gained by habitual

selection of this kind, which a little cultivation will make easy and instinctive, is one of the most essential elements in a good style". All of which is excellent advice.

His loss will be keenly felt by the university.

This refers to the death of an honored member of the faculty; the writer meant:

"The loss of him will be keenly felt . . ."

If that sounds stilted, try another phrase that will express the meaning, such as "the loss of his engaging personality" or "the loss of his administrative ability". State the special nature of the loss and honor the memory of a useful man at least with a significant statement.

The double possessive is used:

However, that prejudice of the doctor's . . .

Another proposal was that of Hamilton's, the manager of the mine.

Such infelicities of language can be avoided, and in the avoidance of them the writer will acquire the elements of a good style. Thus:

"However, the doctor's prejudice in this matter . . ."

"Another proposal was the one made by Hamilton, the manager of the mine."

The vein has been cut off by a fault on the 400-ft. level, but a cross-cut on the 500-ft. level has encountered its continuation in depth some 200 ft. to the south.

If the vein has been cut a hundred feet deeper, it must have continued in depth to that extent at least. "Its continuation" is bad. I would say:

"On the 400-ft. level this vein has been cut off by a fault, but it has been found again on the 500-ft. level about 200 ft. southward."

A famous administrator writes:

This great body of men . . . possesses a unique understanding of many of our intricate economic problems and an influence in their solution not equalled by any other part of the community.

He had better have said, "in the solving of them".

The ore deposits in the limestone are in the form of bunches, and their discovery [the discovery of which] would not be furthered if the enormous areas could be acquired easily by one person.

No editor can afford to be indifferent to them, or neglect any opportunity for their study.

It is better to write, "neglect any opportunity to study them" or "for the study of them".

Ruskin is a good exemplar in this matter; he would not say, "I ask you to note *its* beauty"; he would say "I ask you to note the beauty of it". For instance, in the passage describing the old tower of Calais he says: "The large neglect, the noble unsightliness of *it*; the record of its years written so visibly, yet without sign of weakness or decay . . . and the gray peak of *it* seen far across the sea, principal of the three that rise above the waste of surfy sand and hillocked shore—the light-house for life, and the belfry for labor, and this for patience and praise".

Ruskin writes that the mountains are meant to be "maintained in magnificent eminence before the eyes of men", whereas an amateur probably would say 'men's eyes'. I am tempted to quote again from the same master of our language:

What space of time was in reality occupied by the 'day' of Genesis, is not, at present, of any importance for us to consider. By what furnaces of fire the adamant was melted, and by what wheels of earthquake it was torn, and by what teeth of glacier and weight of sea-waves it was engraven and finished into its perfect form, we may perhaps hereafter endeavor to conjecture; but here, as in few words the work is summed by the historian, so in few broad thoughts it should be comprehended by us; and as we read the mighty sentence, "Let the dry land appear", we should try to follow the finger of God, as it engraved upon the stone tables of the earth the letters and the law of its everlasting form; as, gulf by gulf, the channels of the deep were ploughed; and cape by cape, the lines were traced, with divine foreknowledge, of the shores that were to limit the nations; and chain by chain, the mountain walls were lengthened forth, and their foundations fastened for ever; and the compass was set upon the face of the depth, and the fields, and the highest parts of the dust of the world were

made; and the right hand of Christ first strewed the snow on Lebanon, and smoothed the slopes of Calvary.

A newspaper reporter would be inclined to write "Christ's right hand" and "Calvary's slopes". As a writer in 'The Weekly Review' [now 'The Independent'] says: "*The death rate of Chicago is not decreasing, but Chicago's death rate is. During the war the hope of peace did not disappear, but the peace hope did. The lynching of negroes in Georgia has not become unfashionable, but Georgia's negro lynching has. The automobile industry in Detroit did not suffer a relapse, but Detroit's automobile industry did. The opening of navigation did not occur May 1 on the Great Lakes, but the Great Lakes' navigation did. Nothing happened to the capitol at Springfield, but something did to Springfield's capitol. Quousque tandem?*"

The "besetting sin of too much possessive case" is one from which we ought to pray for escape. A technical article is entitled: 'Mining Accidents and their Prevention', meaning the prevention of them. But headlines are beyond the reach of literary criticism!

VIII. THE RELATIVE PRONOUNS

An educated man is distinguished neither by his clothes nor by his knowledge; he is remarkable not for the things he says, but for the way he says them. You cannot even stand with him under an archway in the rain without finding him out. He may talk only of the weather. His words and his phrases alike may be simple. What distinguishes him is the arrangement of his words; however desultory his talk, it will be methodical; he has habituated himself to foreseeing the part to be played by each word he uses and the place to be taken by each sentence he utters. On the other hand, the uneducated man, though shrewd and well-informed, will relate facts and events as they recur to him, generally in disorder; in his effort to recollect and in his attempt to rectify forgetfulness he will pause irregularly, filling the intervals with meaningless phrases, such as "and then", "and so", or "said he to me", "said I to him"; and even the continuous parts of his story will be told confusedly—because he has not learned the proper use of words.*

My own experience as an editor of technical manuscripts has taught me that the misuse of 'that' and 'which' is a fruitful cause of obscurity and confusion. The relative pronouns have distinct functions, and no writer can express himself clearly until he has learned to discriminate between these functions. For example:

The engineers **who** refused to submit were discharged.
The engineers, **who** refused to submit, were discharged.
The engineers **that** refused to submit were discharged.

* Borrowed from Coleridge, and changed.

These are not three ways of saying the same thing. The first leaves it doubtful whether all the engineers were discharged or only some of them. The second says that all of them were recalcitrant and that all were discharged. The third asserts that only the troublesome ones were discharged.

This induced efforts to concentrate the low-grade ore **which** could not be cyanided profitably.

What does this mean? Is all the low-grade ore to be concentrated or only that portion of it which is not amenable to cyanidation? The first meaning is conveyed by placing a comma before "which"; the second, by substituting 'that' for "which".

This confusion between 'that' and 'which' is the chief difficulty in the use of the relative pronouns, and I shall return to it. Meanwhile let us consider other duties that are performed by these interesting parts of speech.

The relative pronouns serve for reference and connection. 'Who', the possessive 'whose', and the objective 'whom' should refer preferably to living things, usually persons, sometimes animals. By poetic license we may speak of a city "*whose* past is lost in antiquity"; but it is inadvisable to say: "A smelter *whose* operations are profitable forms part of the enterprise". Poetic license is not permitted in technology. So we say: "A smelter, *which* is being operated profitably, forms part of the enterprise".

Historically 'whose' is the possessive of 'what' as well as of 'who', and it is still used as equivalent to 'of which', particularly when the latter produces an awkward construction. Hill states * the rule thus:

"'Whose' is used of anything with animal life or of anything personified; 'of which' is used of anything without animal life, unless euphony requires 'whose'."

He suggests that it sounds better to say:

* 'Beginnings of Rhetoric and Composition', by A. S. Hill, p. 129.

The Lilliputians ask Gulliver to destroy the nation **whose** ships he had already taken

than

The Lilliputians ask Gulliver to destroy the nation **of which** he had already taken the ships

Professor Hill approves of the following:

A lady inquired if a monthly magazine, the name **of which** was unknown to me, had yet arrived.

Preferring this to

A lady inquired if a monthly magazine, **whose** name was unknown to me, had yet arrived.

Similarly I prefer

He said that the mine, the name **of which** escaped me, was worthy of further examination.

Rather than

He said that the mine, **whose** name escaped me, was worthy of further examination.

Here is another example:

In 1919, a 250-kw. generator, **whose** [the] arrival [of which] had been awaited anxiously for some time, was received at Manila by the company with **whom** [which] I was connected.

In the foregoing statement both the generator and the company are personified incorrectly.

The larger mining companies, **who** [which] would lose more by paying exorbitant royalties, are better able to engage in litigation.

‘Which’ is not inflected; it refers usually to things only, not to persons. Nor is ‘that’ inflected; it refers to both persons and things; it cannot be modified directly by a preposition. We do not say “the man in that we trusted”, although colloquially we may say “the man that we trusted in”—an awkward clause. Therefore we prefer to say “the man in whom we

trusted", or, simply "the man we trusted". Likewise we would not say "the house in that Holmes was born"; nor would we care to say "the house that Holmes was born in", but, "the house in which Holmes was born". Thus good usage leans to the side of euphony; yet it is in the effort to be euphonious that the careless writer gets into trouble. For example:

In their enlightened view of a law **that** belongs to another age and **which** [that] has been set aside repeatedly . . .

The writer shied at the repetition of 'that', although, as we shall see, both clauses should have been introduced by 'that', because both are definitive.

Human nature has shown itself in other respects so variable that we cannot be sure it may not change in some forms **which** we have been wont to deem permanent.

Having used the conjunction 'that', he avoided using the pronoun 'that', so he substituted 'which', although the restrictive clause called for 'that'. In this example euphony does not conflict with clearness; but here follows one in which clearness is sacrificed in a similar attempt by the same political philosopher, James Bryce:

As the tendencies of human nature are the permanent basis of a study **which** gives to the subject called Political Science whatever scientific quality it possesses, so the practical value of **that** science consists in tracing and determining the relation of these tendencies to the institutions **which** men have created for guarding their life in a community.

Here one 'that' is sandwiched between two 'whiches'. The "that" is a demonstrative pronoun, not a relative, but the distinction does not affect the question at issue—the desire for euphony. The passage suffers on this account, for he means:

"As the tendencies of human nature form the basis of a study that gives to the subject called Political Science whatever scientific quality it may possess, so the practical value of the science consists in tracing and determining the relation of these tendencies to the institutions that men have created for guiding their life in a community."

Sense must not be sacrificed to euphony, particularly in technical writing, in which grace of diction should be subordinated to clearness and precision. Here is another example showing the sacrifice of precision to euphony:

Public opinion will cordially endorse the action of Judges Staaque and Monaghan in their enlightened view of a law that belongs to another age and which [that] has been set aside repeatedly to meet the changing opinions of a progressive community.

The clause after "which" is just as defining as the one after "that" and the only reason for varying the relative pronouns was the desire for what was considered a pleasant change, which, being made, merely weakens the force and symmetry of the statement.

James P. Kelley * quotes Hill as having defined 'ease' as "the quality *which* makes language agreeable", but on the next page he himself writes: "'The quality *that* makes language agreeable' manifests itself in many ways". He adds: "The writer *who* goes to work to exhibit the pleasing features of his style is on dangerous ground; let him beware lest he violate the first principle of ease". It was to 'ease' perhaps that he sacrificed the 'that' after "writer", and to euphony that we owe his use of it in: "He *that* doesn't care will never learn to write; and he *that* cares will 'take suggestion as a cat laps milk'". Obviously 'he who', repeated, might have suggested the braying of an ass.† No; euphony is too uncertain a guide for the technical writer; it may cajole him into ambiguities that he ought not to risk in the serious work he has in hand. He is more likely to acquire clearness of style if he makes up his mind whether he intends to define or to comment; using 'that' for the first purpose and 'who' or 'which', with commas to set off the clause, for the second.

The use of 'that' in referring to persons is considered old-fashioned by many, and even incorrect by some. Webster's

* 'Workmanship in Words', a stimulating textbook.

† More probably, his familiarity with the King James version of the Bible saved him. "He that loseth his life shall save it".

dictionary defines a 'director' as "one that directs". The Century dictionary says "one who directs". My own leaning is toward the style of Webster. In the definition, "one" stands for 'the kind of person'; it is specific, not general. I would say, "the man that said so is worthy of respect", not "the man who said so . . ." As we shall see later, 'that' usually introduces a definitive or restrictive clause. It is conceded to be required when a superlative is attached to the antecedent, thus:

The **most careful** man **that** I could find on the spot.
He was the **greatest** geologist **that** ever lived.

'That' is also preferred with a word of exclusive or comprehensive meaning, such as 'only', 'any', and 'all'.

The **only** mineral **that** I recognized in the ore was galena.
Anybody **that** goes this way is in danger.
He gave the names of **all** the mines **that** he had examined.

After negatives, use 'that':

I did **not** see one mine **that** I thought worthy even of an option.

The periphrases 'it is' and 'it was' call for 'that', because they introduce a pre-eminently restrictive clause:

It is the alumina in the ore **that** makes it refractory.
It was the heat **that** made him ill.

The use of 'and which' presents another common difficulty. This phrase is permissible only when it is preceded by another subordinate clause introduced by 'which'. It is correct to say:

He went to the Hercules mine, **which** he examined, **and which** he hopes to buy.

It is not proper to say:

This is the kind of cyanide I prefer, **and which** I expect to use in the mill.

Here "which" should be deleted, and 'it' might be inserted after "use"; but it is preferable to avoid the introduction of 'it', thus:

"This is the kind of cyanide I prefer and expect to use in the mill."

It may be possible to operate profitably a small plant using shale conveniently situated **and which** can be mined at a low cost.

This is awkward; I suggest:

"It may be possible to operate profitably a small plant that is near a deposit of shale that can be mined cheaply."

An economist writes:

Necessity developed gradually a sort of central informal council out of this confusion, **which** became more definite toward the close of the war.

Did the "confusion" become "more definite", as is stated? No, he means that the council became defined. He could say it by placing the 'which' after the word to which it refers; thus:

"Out of this confusion necessity developed gradually a sort of informal council, which became more definite toward the end of the war."

Karl Pearson, in 'The Grammar of Science', says:

It is such criticism **which** [that] is the essence of the scientific use of the imagination, which is, indeed, the very life-blood of science.

The chief difficulty is to discriminate between the use of 'that' on the one hand and of 'who' or 'which' on the other. Most writers seem to consider 'that' and 'which' interchangeable; so they employ one as an agreeable variant of the other. This leads to trouble. 'That' also plays the part of an adverb, a conjunction, and a demonstrative pronoun, so they prefer 'which' to 'that' when choice appears permissible. Hence more trouble. I shall take special pains to discuss the uses of 'that' and 'which', because my own experience as an editor has caused me to feel keenly the need for understanding the distinctive functions of these relative pronouns. The main distinction is this:

THE FUNCTION OF 'THAT' IS TO INTRODUCE CLAUSES THAT DEFINE OR RESTRICT; THE FUNCTION OF 'WHICH' IS TO INTRODUCE CLAUSES THAT EXPLAIN OR SUPPLEMENT.

For example, the clause "define or restrict" is itself definitive and restrictive. So is the last clause in the above statement. A simpler example is:

He lives in a house **that** he bought from me.

The clause "he bought from me" is a restrictive one; the meaning of the antecedent, "house", would not be clear without it. "He lives in a house" is incomplete; to make the statement complete something should be added to differentiate the house from houses in general. Thus we see that the restrictive clause is not supplementary, but essential. Let us now consider the kind of clause that should be introduced by 'which'.

He lives in the old Jones house, **which** he bought last year.

Here the second clause is supplementary; it is not essential to the sense. The statement "he lives in the old Jones house" is complete in itself, because the phrase "old Jones" distinguishes the house from other houses, or, as a grammarian would say, it limits the application of the antecedent. Thus we have a test for differentiating between the two kinds of clauses, one requiring 'that' and the other 'which' as an introducer. The relative clause introduced by 'which' can be lifted without spoiling the sense; it can be written as a parenthesis or as a separate sentence, whereas 'that' introduces a clause that can not be separated or omitted without making non-sense.

Let us take another example:

Dogs, **which** of all animals are most friendly to man, sometimes bite their masters.

The clause introduced by "which" can be deleted without killing the sense, for the main statement is that "dogs sometimes bite their masters". The assertion "of all animals are most friendly to man" is non-essential; it is an incidental remark. It may be preferable to avoid the use of 'which', and say:

"Dogs, of all animals the most friendly to man, sometimes bite their masters."

The mill, **which** was quite new, was destroyed by the snowslide.

Here "which" introduces a secondary statement, supplementary to the main one, asserting the principal fact concerning the destruction of the mill. If 'that' had been used, without the commas, the idea conveyed would have been that one mill out of several—namely, the newest of them—had been destroyed.

A process **that** will extract both metals will be adopted.

Here the phrase "will extract both metals" is introduced by "that" because it restricts "the process". Not many processes will extract two metals concurrently; the writer referred to a process competent to extract two specific metals. Remove the restrictive phrase and nothing remains; to say "a process will be adopted" means nothing.

The process, **which** is of recent invention, extracts both the gold and the silver at a low cost.

Here the clause "is of recent invention", introduced by "which", is non-defining; it gives a bit of incidental information, and it can be omitted without spoiling the principal statement concerning the competence of the process to extract the two precious metals cheaply.

The flotation process **which** is no longer in the experimental stage can be applied successfully to an ore of this kind.

Here again the clause after "process" can be lifted without spoiling the sense, and therefore the use of 'which' is correct; but commas should be placed before "which" and after "stage", to mark the relative clause; otherwise the sentence is unorganized.

A flotation method **that** will separate lead from zinc will be used in this mill.

Here the definition of the method of flotation is essential to the meaning, and the defining clause is introduced by 'that'.

The function of the defining clause is to limit the antecedent, which is the noun or clause to which the relative pronoun refers; it may express limitation in several ways, but in whatever way it performs its duty it is essential to, and inseparable from, the antecedent.

The best test for distinguishing between the two kinds of relative clauses or phrases is essentiality. A non-defining clause may in a measure restrict or limit the antecedent because it is descriptive; so also the defining clause may contribute toward comment or explanation; but the test of being essential can be met only by the defining clause: the information given by it must be taken at once, or both it and its antecedent are useless.

Occasionally the defining clause is separated by a parenthesis or a co-ordinate clause, but such locutions are ungainly; for example:

It was the only mine, in fact, **that** he could recommend for purchase.

It is only a man capable of such courage, who sticks to his principles and disregards consequences, **that** is fit for leadership.

It will be noted that the use of 'that' with a superlative or a word of comprehensive meaning, such as 'any' and 'only', is in accord with the foregoing principle, because the restriction has been intimated already, as in

The most careful man **that** I could find

The only mineral **that** I recognized

A simple rule for the use of 'that' and 'which' is given by Alexander Bain, and commended by Edwin A. Abbott in his little guide-book, 'How to Write Clearly'. The rule is: "When using the relative pronoun, use 'who' and 'which' where the meaning is 'and he', 'and it', etc., 'for he', 'for it', etc. In other cases, use 'that' if euphony allows". Thus:

I heard this from the mine manager, **who** [and he] heard it from a man **that** was in charge of the work.

In this example "that" cannot be replaced by 'and he', but "who" can be so replaced. The clause introduced by "who" is continuative and supplementary, whereas the clause after "that" is distinctly restrictive.

Abbott also says: "'Who' and 'which' introduce a new fact about the antecedent, whereas 'that' introduces something without which the antecedent is incomplete and undefined". Thus, in the above example, "I heard this from the mine manager" is a complete statement; "who" introduces additional information concerning him, namely, his having heard about "this" from another man; but the clause beginning with "the man" is incomplete without the restrictive clause, "that was in charge of the work".

Here is another example:

I met the boatman **who** took me across the ferry.

If this should imply, "I met the boatman *and he* took me across the ferry", then a comma ought to precede "who", which introduces the continuative clause; but, if the reference is to a particular boatman by whose help the crossing had been made already, it is proper to say: "I met the boatman *that* took me across the ferry".

Hodgson makes a similar distinction; he says that 'who' and 'which' should connect co-ordinate sentences, whereas 'that' should be restrictive, limiting, and defining. Thus "Margaret Finch, *who* died in 1740, was 109 years old" may be divided into two co-ordinate clauses: "Margaret Finch died in 1740, and was 109 years old". But "Blessings on the man *that* invented sleep" can no more be resolved into two sentences than can "Blessed be the inventor of sleep". The use of 'who' in "Blessings on the man *who* invented sleep" is incorrect, but it is saved from misunderstanding by the continuity of the sense.

How professional writers will hesitate over the selection of the right pronoun is suggested by the manner in which Arnold Bennett rang the changes in the title of one of his books. In 1906,

he named it 'Things *That* Interested Me'; in 1907 he changed the name to 'Things *Which* Have Interested Me'; and in 1921 he chose 'Things *That* Have Interested Me'. Writers that show nice discrimination in the use of 'that' and 'which' are few.

Before continuing the discussion of underlying principles, I shall cite a few more examples of misused relative pronouns.

A party of soldiers from Camp Douglas was guarding some horses belonging to the garrison **which** had been sent to graze in Bingham canyon.

So writes a historian. It was the horses, not the garrison, that had been sent to graze. Substitute 'that' for "which" and re-arrange, thus:

"A party of soldiers from Camp Douglas was guarding some horses that had been sent to graze . . ."

The defunct American Bank of Alaska, at Fairbanks, owns a number of claims on this creek, **which** fell into its hands for money loaned.

If the creek fell into the hands of the bank, as asserted, the stocks held by that institution must have been much watered! The 'which', being preceded by a comma, ties the reference to the immediately preceding word, "creek", although the reference is meant to be thrown back to "claims". Substitute 'that' for "which", and delete the comma. Even then the phrasing is awkward. I suggest:

"The defunct American Bank of Alaska, at Fairbanks, loaned money on a number of claims on this creek and now owns them."

The smelter at Trail is treating ore from the Sunshine mine at a profit **which** runs only \$6.10 per ton.

Is the profit \$6.10? No; for that would be ample, and would render "only" superfluous. It is the ore that assays "only \$6.10 per ton". Substitute 'that' for "which" and the meaning becomes clear. If "at a profit" is replaced by 'profitably', the meaning will be clearer still; but the sentence has been patched and is ugly. It needs to be reconstructed, thus:

"The Trail smelter is making a profit on the treatment of Sunshine ore that runs only \$6.10 per ton."

It will be noted that 'who' or 'which' usually refers to the word immediately preceding, whereas 'that' may throw the reference back to a word or a clause in the earlier part of a statement. I give you another illustration of this relationship:

All the ore from the lower level *that* is not now under water is being sent to the mill.

What is under water? The lower level, or only a part of the ore on the lower level? If the lower level be meant, 'which' should replace "that", and two commas are needed to complete the supplementary clause, thus:

"All the ore from the lower level, *which* is not now under water, is being sent to the mill."

If a part of the level is still under water, the sentence should read:

"All the ore on the lower level *that* is not under water is being sent to the mill."

I recommend the flotation process *that* has been developed so successfully in Australia for the treatment of the Miami ore.

He does not say what he means; he means to recommend the flotation process in general and desires to remark incidentally that it has been developed successfully in Australia; he is not recommending a particular method of flotation that was developed in Australia. This meaning can be expressed clearly by changing "that" to 'which', and by placing commas before 'which' and after "Australia", thus:

"I recommend the flotation process, *which* has been developed so successfully in Australia, for the treatment of the ore at Miami."

This, however, is not satisfactory; the sentence needs to be re-organized. I suggest:

"For the treatment of the ore at Miami I recommend the flotation process, which has been developed so successfully in Australia."

Resolved, that drinking-places, **which** are haunts of vice, are dangerous and should be eliminated.

This resolution was submitted at a convention of brewers. They did not mean that all drinking-places were "haunts of vice", for that would have cast an aspersion on their own business; they meant to "eliminate" only such drinking-places as were haunts of vice. The relative clause was meant to be restrictive, but the use of 'which' instead of 'that' made it continuative and explanatory. The commas should be deleted, thus:

"Resolved: drinking-places *that* are haunts of vice are dangerous and should be eliminated."

President Wilson, in his official statements, usually showed an appreciation of the defining function of 'that', but not always; for example:

The German government denies the right of neutrals to use arms at all within the areas of the sea **which** [that] it has prescribed, even in the defence of rights **which** [that] no modern publicist has ever before questioned their right to defend.

Both the clauses introduced by "which" restrict and define; the substitution of 'that' makes the statement clearer and stronger.

This is a bit of land **which** [that] the Rio Grande, **which** is the boundary-line between Mexico and the United States, has, by a change in its course, carved out of El Paso and made into Mexican soil.

The first "which" should be replaced by 'that' because the clause "the Rio Grande has carved . . . soil" is definitive; it restricts and defines the "bit of land". The use of the second "which" is correct, because it introduces the supplementary clause explaining that the river serves as a boundary-line between the two countries. This clause can be lifted without spoiling the sense, whereas the former is the very essence of the statement.

A distinguished traveler, once chaplain to Queen Victoria, **who** knew the United States as few Englishmen know it, mentions the fact . . .

Who "knew the United States", the chaplain or the Queen?
He means:

"A distinguished traveler, who was once chaplain to Queen Victoria and who knew the United States . . ."

There is a continuous re-solution of deposited zinc by the cell-solution **which** varies with the chemical and physical condition of the electrolyte.

What varies? The statement asserts that the "cell-solution" varies, but the writer is referring to the "re-solution". He can say so by substituting 'that' for "which".

This is a fair statement of a problem **which** is vital to the welfare of this republic.

It is the solution or solving of the problem, not the problem itself, that is "vital". I suggest:

"This is a fair statement of a problem the solving of which is vital . . ."

The Council of National Defense was responsible for the following:

If you do not own a smelter, may we ask you to instruct the smelter **which** [that] treats your ores to furnish one-sixth of the lead content of the ore **which** [that] it accepts from you in July on the Government order and notify them that you will accept in settlement for that amount of lead in your ore the price **that** the Government pays.

Apparently the two 'whiches' were used for the sake of variety or euphony, because the clauses they introduce are as distinctly definitive as the last clause ("that the Government pays"). Of the other 'thats', one is a conjunction ("notify them that") and the other a demonstrative pronoun ("that amount of lead"). The entire statement is infelicitous. The word 'smelter' is used first to signify a plant and then to signify the manager or the owners of the plant. To whom does "them" refer? Presumably to the owners of the smelting plant. I suggest:

"If you do not own a smelter, may we ask you to notify the manager of the plant that smelts your ore to apply one-

sixth of the lead content during July on Government account; and will you please also notify the manager that you will accept, in settlement for this sixth, the price the Government is paying."

John Graham Brooks writes:

One of the most careful of our critics **who** studied us for three years felt this danger.

The superlative calls for 'that'. How many of these critics studied us for three years? The superlative is superfluous. He might have written:

"A careful critic, *who* studied us for three years, felt this danger."

An author and a professor of English writes:

That is the gist of the whole matter **which** [that] is the subject of this book.

For special ideas and interests **which** [that] may at any time fall under a writer's hand.

In telling something of the instrument **which** [that] we daily employ.

That instrument—our language—will be employed with more effectiveness if we employ the relative pronouns discriminatingly.

President Harding, in his inaugural address, said:

America can be party to no permanent military alliance. It can enter no political commitments nor assume any economic obligations **which** [that] will subject our decision to any other than our own authority.

The essence of this statement is the definition of the commitments and obligations the United States will not incur. The "which" should be replaced by 'that'. A lack of concord is evident. The President might have continued to speak of America as 'it', and spoken of "its decision" and "its own authority", but as he was speaking as the Chief Executive he might have said:

"We can enter no political commitments nor assume any economic obligations that will subject our decision to any other than our own authority."

In the 'Saturday Review' I found the following example:

This is the sort of opportunity **which** the real Washington, the Washington **that** counts—that little, intimate, barricaded society, **which** begins where nineteen-twentieths of the city ends—has lived and dreamed of, hitherto in vain.

The first “**which**” ought to be ‘**that**’; the clause it introduces is as definitive as the one introduced by the first “**that**”. The second “**that**” is a demonstrative pronoun, and it is tied to the second “**which**”, before “**begins**”; therefore the comma before the “**which**” does not belong there. I suggest:

“This is the sort of opportunity **that** the real Washington, the Washington **that** counts—the little, intimate, barricaded society **that** begins where nineteen-twentieths of the city ends—has lived and dreamed of, hitherto in vain.”

Sidney Colvin, in the ‘Introduction’ to ‘The Letters of Robert Louis Stevenson’, says:

Once more, it may be questioned whether among the many varieties of work **which** [that] Stevenson has left, all touched with genius, all charming and stimulating to the literary sense, all distinguished by a grace and precision of workmanship **which** [that] are the rarest qualities in English art, there are any **which** [that] can be pointed to as absolute masterpieces, such as the future cannot be expected to let die.

The “precision of workmanship” of Stevenson’s literary executor suffers, I think, by the repeated use of ‘**which**’ where ‘**that**’ is required, because in each phrase the pronoun begins a restrictive clause.

Here I venture to quote three passages from Stevenson himself because they are to the point.

The difficulty of literature is not to write, but to write what you mean; not to affect your reader, but to affect him precisely as you wish.

The business of life is mainly carried on by means of this difficult art of literature, and according to a man’s proficiency in that art shall be the freedom and fulness of his intercourse with other men.

The books that we re-read the oftenest are not always those that we admire the most; we choose and re-visit them for many and various reasons, as we choose and re-visit human friends.

This last quotation shows that Stevenson appreciated the proper use of the relative pronouns.

I quote another example of the forceful use of the correct relative pronoun, from the description of Richard Hooker in Charles M. Gayley's 'Shakespeare and the Founders of Liberty in America':

In Sandys and Shakespeare we recognize the religious ideal of freedom tempered by reverence, the political ideal of liberty regulated by law and conserved by delegated authority, the moderation, tolerance of divergent opinion, the broad and sympathetic confidence in progress rather than in rigidity or finality, **that** are characteristic of the most philosophical writer upon politics, the broadest minded, most learned, and most eloquent divine of sixteenth-century England.

Note how the five antecedent words and phrases are introduced by "that" so as to accentuate the completeness of the description. This eloquent utterance would have been wrecked by the use of 'which'.

There is an exception to every rule. Our comprehension of a rule will be tested by recognizing the exception, for it is then that we learn how to follow the spirit of the rule intelligently, not mechanically. 'That' is not available for all restrictive clauses, for in some of them the conjunction 'that' may lead to an awkward repetition of the word. For instance,

He said **that** he had examined a mine in the Leadville district **which** is in a position to furnish large quantities of manganese.

"Which" should be replaced by 'that'; in consequence, the conjunction "that" would be too near the pronoun 'that'. This would be awkward. The first 'that' might be spared, because it will be understood.

If a sentence appears doubtful in the light of any rule it is probably the sentence, not the rule, that needs changing. When in doubt, rebuild the sentence. That this is good advice is suggested by my own attempts to patch the ragged phrasing of the examples quoted.

Jones, who was one of the men **whom** [that] I brought from Colorado, would not leave his work, **which** ensured the completion of the job **which** [that] I had much at heart.

The first "which" has a clause for its antecedent:

"Jones, who was one of the men I brought from Colorado, would not leave his work, and his fidelity ensured the completion of a job I had much at heart."

In the mountains of the State there are hidden rare minerals, besides gold, copper, and silver, **which** are able to produce some of the metals most needed in the iron and steel industries.

The "which" refers to "rare minerals", not to "gold, copper, and silver".

"In the mountains of the State are to be found not only ores of gold, silver, and copper, but also minerals that contain rare metals needed in the iron and steel industry."

There were very few miners, who escaped without serious injury.

This might be resolved into "and all escaped", whereas if 'that' had been used, without the comma, the truth would have been stated, namely, that almost all the miners were seriously injured. The relative pronoun is not needed. I suggest:

"Few miners escaped serious injury."

The foregoing examples serve to illustrate the advantage to be gained by re-writing an awkward or ambiguous sentence. A doubtful meaning is worse than a grammatical error. Do not hesitate to re-build the sentence if it seems unsafe.

Hoisting was done through the centre compartment only, by means of two 15½-cu. ft. buckets used alternately and dumped automatically on top into the car by means of a chain hung from the head-frame **which** was hooked into a ring on the bottom of the bucket holding the bottom stationary and allowing it to tip on an incline-door and chute, thereby discharging its contents.

The head-frame was not hooked to the bottom of the bucket! "Which" refers to the chain. Splitting into two sentences and proper punctuation will clarify the meaning, thus:

"Hoisting was done through the central compartment only, by means of two 15½-cu. ft. buckets, *which* were used alternately and dumped automatically at the surface into a car by means

of a chain hanging from the head-frame. This chain was hooked to a ring on the bottom of the bucket so as to hold it stationary while it was being tipped for discharge upon an incline-door and chute."

Here 'which' introduces a supplementary statement, followed by further information.

Many of the examples quoted serve to show that it is best not to tinker with a bad sentence but to re-write it. By so doing you not only make a useful correction, but you learn to improve your composition. Mistakes, when corrected, become stepping-stones to the attainment of skill in writing, as of success in life generally.

It may seem that I have laid excessive stress on the distinction between the relative pronouns, particularly as it must be granted that the practice of reputable authors varies. So good a teacher as Professor Hill says that "in this matter the ear is a surer guide than any theory", and he imputes the use of 'that' in such lines as

Hearts that once beat high for praise (Moore)

Thoughts that breathe and words that burn (Gray)

not to any grammatical theory but to euphony, because "'that', following without intervening pause a plural noun ending in 's', is easier to speak and more agreeable to hear than 'which' would be".* But to this I must demur; the 'thats' in these quotations are doing their proper duty.

It may be argued that because some of the great masters of our language are inconsistent in their use of 'that' and 'which', therefore it is not for technical writers to attempt to make the distinction. I think it is, if we can increase the clearness of our expression thereby. For instance, Ruskin says:

Out of the infinite heap of things around us in the world, human invention chooses a certain number **which** it can thoroughly grasp, and presents this group to the spectator in the form best calculated to enable him to grasp it also, and to grasp it with delight.

* A. S. Hill, *Op. cit.* Page 126.

This was written by one who was a past-master in the art of writing, yet the "which" introduces a defining clause and therefore, I suggest, should give place to 'that'. He is explaining how human invention chooses a small number of things out of a heap of things, and it chooses to select the particular things it can grasp thoroughly; therefore 'that' is preferable; it expresses the meaning more clearly than 'which'. Let it be noted, moreover, how Ruskin avoids the unnecessary use of 'that' and 'which', as for example, in the introductory sentence in the above quotation, where he might have written: "Out of the infinite heap of things *that are* around us in the world". Most of us use these relative pronouns too frequently, causing needless difficulties for ourselves. I am tempted to quote Ruskin further, partly because the quotations are delightful in themselves, but mainly to show how his indifference to the distinction between 'that' and 'which' is a defect in his splendid writing. I shall quote from the fourth volume of 'Modern Painters' because it deals with geology. He speaks of the motion given to water by the mountains:

Every fountain and river, from the inch-deep streamlet **that** crosses the village lane in tumbling clearness, to the massy and silent march of the everlasting multitude of waters in Amazon or Ganges, owe their play, and purity, and power, to the ordained elevations of the earth. Gentle or steep, extended or abrupt, some determined slope of the earth's surface is **of course** necessary, before any wave can so much as overtake one sedge in its pilgrimage; **and** how seldom do we enough consider, as we walk beside the margins of our pleasant brooks, how beautiful and wonderful is that ordinance, of **which** every blade of grass **that** waves in their clear water is a perpetual sign; that the dew and rain fallen on the face of the earth shall find no resting-place; shall find, on the contrary, fixed channels traced for them, from the ravines of the central crests down **which** they roar in sudden ranks of foam, to the dark hollows beneath the banks of lowland pasture, round **which** they must circle slowly among the stems and beneath the leaves of the lilies; paths prepared for them, by **which**, at some appointed rate of journey, they must evermore descend, sometimes slow and sometimes swift, but never pausing; the daily portion of the earth they have to glide over marked for them at each successive sunrise, the place **which** has known them knowing them no more, and the gateways of the guarding mountains opened to them in cleft and

chasm, none letting them in their pilgrimage; and, from far off, the great heart of the sea calling them to itself!

He used 'that' twice to introduce a restrictive clause, but he also uses a 'which' for precisely the same purpose. Is it not preferable to say "the place *that* has known them"? A 'that' is omitted after "daily portion of the earth", for the clause "they have to glide over" is restrictive and calls for a 'that'. However, the omission does not obscure the sense, and is felicitous. The "of course" is a blemish; the statement in which it appears is no more self-evident than many others in the same paragraph; it mars the dignity of the diction. Delete the "of course" and the comma after "necessary". Note how skilfully he uses "down which", "round which", and "by which", in sequence, to describe the course of the water. The previous use of "of which" is likewise happy. Note also the effectiveness of the two 'ands' in "their play, and purity, and power" to emphasize the manifold consequences of nature's ordinance; but he uses too many 'ands'; for instance, the one before "how seldom", where he joins two separate ideas.

Here is another fine passage to show the use of these troublesome pronouns. He is speaking of the beauty of the district between Valorsine and Martigny.

The paths **which** lead to it out of the valley of the Rhone, rising at first in steep circles among the walnut trees, like winding stairs among the pillars of a Gothic tower, retire over the shoulders of the hills into a valley almost unknown, but thickly inhabited by an industrious and patient population. Along the ridges of the rocks, smoothed by the old glaciers into long, dark, billowy swellings, like the backs of plunging dolphins, the peasant watches the slow coloring of the tufts of moss and roots **which**, little by little, gather a feeble soil over the iron substance; then, supporting the narrow strip of clinging ground with a few stones, he subdues it to the spade; and in a year or two a little crest of corn is seen waving upon a rocky casque. The irregular meadows run in and out like inlets of lake among these harvested rocks, sweet with perpetual streamlets, **that** seem always to have chosen the steepest places to come down, for the sake of the leaps, scattering their handfuls of crystal this way and that, as the wind takes them, with all the grace, but with none of the formalism, of fountains; dividing into fanciful change of dash and spring, yet with the

seal of their granite channels upon them, as the lightest play of human speech may bear the seal of past toil.

This "play of human speech" is so exquisite that it is safe to infer the toil of the true artist. Note the imagery: the paths like "winding stairs"; the rounded rocks "like plunging dolphins"—the porpoises of unpoetic fact; "the crest of corn upon the rocky casque"; the meadows "like inlets of lake among the harvested rocks". Note also the large proportion of simple Anglo-Saxon words, rendering the few Latin words particularly effective. But what of the 'thats' and 'whiches'? The first "which" should be replaced by 'that' because it introduces a definition of "the paths", namely, those leading to this district from the Rhone. It may be that Ruskin preferred 'which' to 'that' because he wished to avoid the repetition of 'th' in the sequence 'paths that'. He could have avoided the difficulty in another way, by using the participle 'leading', but this would have necessitated an 'and' before the next participle, "rising"—a joint he employs rarely in his construction. He uses "and" to tie words together five times in this passage, but only once to connect statements. The second 'which' will be acceptable to most readers, who will regard the clause it introduces as merely descriptive, and not essential. If it be so, a comma should precede it. However, I venture to suggest that the clause telling about the gathering of a feeble soil by the tufts of moss and roots is an essential part of his argument and therefore it were better to use 'that' after "roots". The first "that" should be replaced by a 'which', because it introduces a supplementary clause, conveying incidental description. Moreover, the use of 'which' would be acceptable because it would avoid the repetition of 'that' two lines lower. The second "that", it will be noted, is a demonstrative. Ruskin was writing something akin to poetry, and may be deemed beyond the criticism that applies to technical writing, which is endangered by too much listening for euphony.

These quotations suffice to illustrate how Ruskin ignored the distinction on which I have ventured to lay stress. Other

skilful users of English show the same disregard; for example, Huxley. He is speaking of the formation of coal:

When the fallen trunks **which** have entered into the composition of the bed of coal are identifiable, they are mere double shells of bark, flattened together in consequence of the destruction of the woody core; and Sir Charles Lyell and Principal Dawson discovered, in the hollow stools of coal trees of Nova Scotia, the remains of a different character from **that** **which** surrounded the exterior of the trees. Thus, in endeavoring to comprehend the formation of a seam of coal we must try to picture to ourselves a thick forest, formed for the most part of trees like gigantic club-mosses, mares-tails, and tree-ferns, with here and there some **that** had some resemblance to our existing yews and fir-trees. We must suppose that, as the seasons rolled by, the plants grew and developed their spores and seeds; that they shed these in enormous quantities, **which** accumulated on the ground beneath; and that, every now and then, they added a dead frond or leaf; or, at longer intervals, a rotten branch, or a dead trunk, to the mass.

This is quoted from one of his popular lectures, revised before publication, of course, but still not an example of his most finished style. Nevertheless, it illustrates his power as an expositor of science to the unlearned.

Three single relative pronouns are used, besides the compound "that which". This obviously is necessitated by euphony. Even where the two pronouns, one demonstrative and the other relative, are separated we use 'that which' instead of 'that that'. On the other hand, the use of 'those that' is permissible, and even preferable to 'those which', although usually the definite article suffices, as in:

To conserve part of those [the] dividends **that** were received last year.

Returning to our quotation from Huxley; the first "which" introduces a restrictive clause. It is true, by placing a comma before "which" and after "bed of coal", the clause could be treated as supplementary and descriptive, because Huxley had previously introduced the idea of coal being formed from fallen trees, but in the opening sentence of this paragraph he is undoubtedly defining the "fallen trunks" as the subject under discussion. The "that" before "had some resemblance" is

acceptable, for it is followed by a restrictive clause. The second "which" likewise is correct, for it introduces a supplementary and non-essential bit of information.

I shall quote from Huxley again, and from the same 'lay sermon':

Let us suppose that one of the stupid, salamander-like Labyrinthodonts, **which** potted, with much belly and little leg, like Falstaff in his old age, among the coal-forests, could have had thinking power enough in his small brain to reflect upon the showers of spores **which** kept on falling through years and centuries, while perhaps not one in ten million fulfilled its apparent purpose, and reproduced the organism **which** gave it birth: surely he might have been excused for moralizing upon the thoughtless and wanton extravagance **which** Nature displayed in her operations. But we have the advantage over our shovel-headed predecessor—or possibly ancestor—and can perceive that a certain vein of thrift runs through this apparent prodigality. Nature is never in a hurry, and seems to have had always before her eyes the adage, 'Keep a thing long enough and you will find a use for it'. She has kept her beds of coal many millions of years without being able to find much use for them; she has sent them down beneath the sea, and the sea-beasts could make nothing of them; she has raised them up into dry land, and laid the black veins bare, and still, for ages and ages, there was no living thing on the face of the earth **that** could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her workshop, **who** by degrees acquired sufficient wits to make a fire, and then to discover that the black rock would burn.

Six relative pronouns appear. The first is preceded by "one", a word of exclusive meaning; it introduces a bit of unessential, but delightful, description concerning the labyrinthodonts—they "potted with much belly and little leg, like Falstaff in his old age". The second "which" begins a restrictive clause, for, it seems to me, the words that follow, from "kept" to "birth", are essential to the statement, as is further suggested by the use of the definite article before "showers of spores". He is referring to showers of spores of a particular kind. The third "which" undoubtedly should be replaced by 'that', for he defines the organism as the particular one from which the spore was born. The fourth "which" might be

omitted; if not, then it also should give place to a 'that', for it introduces a restrictive clause. The fifth relative pronoun is a 'that', as it should be; but if he uses it here why does he not use it where the previous 'which' appears? Evidently he employs them indiscriminately. Then comes a 'who', following "workshop", but with no reference to that word. By substituting 'that' and deleting the comma the sense is carried back to "new creature" and connected with the subsequent clause. He has used the conjunction 'that' immediately before and he uses it again in the last clause of the paragraph, so he might have preferred the latter for the sake of euphony; but it is more probable that he used 'who' in order to personify man's progenitor.

It will be noted that, in these quotations, Huxley uses 'and' too frequently. He might have employed other connectives. The 'and' before "Sir Charles Lyell", in the first quotation, is particularly bad because he uses it to join two discrete ideas; moreover, he is compelled to use another 'and' immediately afterward to link the names of the two geologists. The writings of these great men are not immune from criticism, which neither lessens our appreciation of their skill nor diminishes our enjoyment of their work.

The Bible is an exemplar in this as in other uses of our language. For instance, the King James translation of 1611 says that when Christ was asked about the tribute money he looked at the Roman denarius and said: "Render therefore unto Cæsar the things *which* are Cæsar's; and unto God the things *that* are God's." On the other hand, the revised version of 1901 uses 'that' in both clauses, thus: "Render therefore unto Cæsar the things *that* are Cæsar's; and unto God the things *that* are God's". The original Greek text uses the possessive and the dative respectively, the literal translation being: "Render the things of Cæsar to Cæsar, and the things of God to God". Apparently the variation in the use of the relative pronouns by the translators of 1611 was prompted not so much by euphony as by rhetoric, the 'that' clause being more defini-

tive and more conclusive. Thus in chapter xxiv of Matthew, beginning at verse 15, we find:

15 When ye therefore shall see the abomination of desolation, spoken of by Daniel the prophet, stand in the holy place, (**whoso** readeth, let him understand):

16 Then let them **which** be in Judæa flee into the mountains:

17 Let him **which** is on the housetop not come down to take any thing out of his house:

18 Neither let him **which** is in the field return back to take his clothes.

19 And woe unto them **that** are with child, and to them **that** give suck in those days!

This is the King James version. Note the effect of the unexpected change to the use of the two 'thats' in the last verse; it is impressive and climactic. Now let us turn to the revised version:

15 When therefore ye see the abomination of desolation, **which** was spoken of through Daniel the prophet, standing in the holy place (let him **that** readeth understand), 16 then let them **that** are in Judæa flee unto the mountains: 17 let him **that** is on the housetop not go down to take out the things **that** are in his house: 18 and let him **that** is in the field not return back to take his cloak. 19 But woe unto them **that** are with child and to them **that** give suck in those days!

It will be noted how 'that' is used consistently throughout to introduce distinctly restrictive clauses. This is done even to a fault, for one of the two 'thats' and the "are" that follows it in verse 17 are unnecessary. The later translators have inserted a 'which' after "abomination", as if to emphasize the explanatory character of the clause. This is an improvement; so is the use of the adversative 'but' in lieu of 'and' in the last verse. The substitution of 'that' for 'whoso' in the parenthesis is in accord with modern usage, and the retention of "readeth" helps to preserve the prophetic manner.

Verse 23 in chapter xxii of Matthew, in the old version, reads thus:

The same day came to him the Sadducees, **which** say that there is no resurrection.

The modern version says:

On that day there came to him Sadducees, they **that** say that there is no resurrection.

The later translation is rendered ungainly by the use of the two 'thats', one of them a conjunction, in close context, besides the other 'that', a demonstrative pronoun, in the preceding clause. The second clause, it seems to me, is not restrictive but explanatory, and therefore it would seem advisable to retain the older version, with a substitution of 'who' for "which", thus:

"The same day there came to him the Sadducees, who say that there is no resurrection."

In the parable of the talents, a series of restrictive clauses is marked by 'that'; for example: "He *that* received the five talents" and "He *that* had received two". See Matthew xxv, 14 to 30. When, however, he "*that* had received the one talent" made excuses, his lord said:

Take therefore the talent from him, and give it unto him **which** hath ten talents.

The literal translation of the Greek is:

"Therefore take away the one talent from him and give it to him having the ten talents."

The modern version substitutes a 'that' for "which", and makes other slight changes:

Take ye away therefore the talent from him, and give it unto him **that** hath the ten talents.

This seems consistent in its correctness.

I venture one more comment on the English of The Book.

In the description of the Cities of Refuge (Numbers xxxv, verse 11), the old version says:

That the slayer may flee thither, **which** killeth any person at unawares.

The revised version has it thus:

That the manslayer **that** killeth any person unwittingly may flee thither.

In verse 15, the old version reads:

That every one *that* killeth any person unawares may flee thither.

Whereas the revised version says:

That every one *that* killeth any person unwittingly may flee thither.

The use of 'that' to introduce a definitive clause—the killing unwittingly or unawares—is recognized.

In making the foregoing comparisons between the King James version of the Bible and the revised version, it may seem that the comparison of texts imputes error to the older version, whereas, of course, it was written in the best English of its day and if it differs from the best usage of today it is because English idiom has changed greatly in the interval. Addison's paper on the relative pronouns proves that.

Careful reading of the best writings suggests that the general rule for the use of 'that' to introduce clauses expressing essential limitation, restriction, distinction, or definition is subject to exception; it may lead to locutions that are unacceptable. In attempting to write with precision, we need not unnecessarily deviate from usage that is old, honored, and persistent. As the word 'that' plays the part not only of a relative pronoun, but that of a demonstrative pronoun, an adverb, or a conjunction, it may be desirable occasionally to spare it. We have seen how an occasional 'that' can be dropped to advantage. "A house not built by hands" has greater precision, conciseness, perspicuity, and dignity than "A house *that* is not built by hands". Evidently sub-rules are needed. These can be found by analyzing the best writings. I venture to suggest four sub-rules:

(A) If the antecedent and the relative with its verb are brought together as in the sentence just quoted, it may be well to omit the relative and its verb.

(B) If the indefinite article precedes the subject [for example, "*a* person"], the pronoun 'who', 'whom', or 'which' should introduce the subsequent clause [for example, "whom you are anxious to persuade"]; but when the definite article is

used [*"the person"*], the pronoun 'that' should be employed to introduce the subsequent clause [*"that you are anxious to please"*].

In the first example, "a person" is not an individual but the representative of a group; in the second, the reference is to an individual to whom, or for whose sake in particular, something is to be done. Every relative clause tells something about the noun in the antecedent clause, and is, therefore, in a sense, adjectival; it serves in one way or another to describe, and by so doing to suggest restriction; yet it may not distinguish or particularize; it may not point to it as necessarily the one thing of its kind in the world to which reference is being made. Then 'which' is preferable. When, on the contrary, the idea of another thing with the same name is implicit, and the subsequent clause says in effect, "This is the one I am talking about, not any of the others", then 'that' is demanded.

The police captured a thief **who** had a mole on the end of his nose, an ear missing, six toes on his left foot, and whose thumb-print belonged to subdivision 67 of class G.

There may have been no trouble in identifying him, yet the clause giving all this information may begin properly with 'who'. On the other hand: "The police caught the thief *that* they sought" points to one only; it separates him from others more completely than do all the marks mentioned in the preceding quotation.

(C) When a person or thing has been mentioned already as possessing some quality that differentiates him or it from others of his or its class, then 'who' or 'which' is preferable to 'that' in beginning a clause designed to recall the quality. "The Denver editor who was contemptuous of the effort to write well ignored this rule." My previous mention of him, as the man that wanted "to get there" in his own slipshod way, made it unnecessary to identify him; therefore the clause after 'who' is a supplementary clause, by way of reminder only.

(D) The relative clause ceases to introduce a necessary definition whenever the antecedent has been defined by a pos-

sessive pronoun; therefore 'who' or 'which' should replace 'that'.

My brother, **who** enlisted two years ago, has returned from France.

If he had several brothers and was referring to the one that went to France, he would use 'that' instead of 'who', and delete the commas after "brother" and "ago".

The lavish use of the relative pronouns invites needless trouble for both the writer and the reader. Several substitutes are available.

(a) When the relative pronouns have led you into verbal entanglement, cut loose and start again with 'and this'.

He enlarged the mill, **which** enabled him to lower the cost per ton.

It is better to say:

"He enlarged the mill, and thereupon was able to lower the cost per ton."

(b) Another means of escape from a choice of relative pronouns is to end the first clause with a semicolon and start the next with a 'this'; for example:

"He enlarged the mill; this enabled him to lower the cost per ton."

Add ammonium chloride to the aqua regia solution, **which** will precipitate crystals of ammonium platinic chloride if platinum is present.

The "solution" does not precipitate the crystals, but the ammonium chloride. The meaning is made clear by writing:

"Add ammonium chloride to the solution. That will precipitate crystals . . ."

Ore is supplied from the Purisima mine in the Balcones district **which** is a mixture of iron and copper pyrite.

The "ore", not the "district", is "a mixture of iron and copper pyrite". Place a semicolon after "district" and start again with "this ore"; or write:

"The ore, a mixture of iron and copper pyrites, is supplied . . ."

(c) The defining clause can be replaced by the present participle, but be sure you have a noun for it!

I have seen an Australian gold ore **that** resembles this.

"That resembles" can be replaced by "resembling".

On the other hand, the participle may be insufficiently definitive, as in:

The editorial of interpretation points out the hidden significance of statements appearing [that appear] on the surface [to be] little more than commonplace.

(d) The infinitive is a common substitute, thus:

He was the first **that succeeded** [to succeed].

This is not a man **that will save** [to save] money.

(e) The relative pronouns are used often to introduce a clause giving a reason, whereas the explanatory clause should begin with 'whereas', 'because', or 'although'.

Mines, which are usually regarded as sources of wealth, are often the cause of financial loss.

"Which are" can be replaced by 'although'.

(f) Other methods of escaping from the relative pronouns are available.

The first thing noticed is the paucity of data and next the inaccuracy of **those which** [such as] are obtainable.

Let us take a claim on which all the section corners are easily found, **which** [as] is rarely the case.

I have drawn attention already to the occasional omission of the relative pronoun as favorable to perspicuity rather than to obscurity. Landor, in his 'Imaginary Conversations', makes Horn Tooke quote Cato, after Middleton:

The high office **which** you fill and the eminent distinction **that** you bear.

To which Dr. Johnson replies:

"Much better without both 'which' and 'that'."

Later Tooke says: "The rejection of 'that' in the proper place is a cause of peculiar elegance, for it bears heavily on our language. The Romans were fortunate to avoid it by means of the infinitive of their verbs".

He said **that** he would be glad to accept the appointment.

‘That’ can be omitted.

Sulphide ore **which** [that] **has** [had] been previously untouched was shipped in large quantities.

Why fuss about the relative pronouns needlessly? State simply:

“Sulphide ore, previously untouched, was shipped in large quantities.”

It follows that the liquids **which** are near their critical point will have small surface-tensions.

If the pronoun is to be used, ‘that’ should replace “which”. But neither is needed. I suggest: “It follows that liquids when near their critical points will have small surface-tensions”.

Substantial evidence is at hand **which** goes to show that floatable minerals have the positive sign of electricity.

“Which” should be ‘that’ because it introduces a defining clause, but the change would bring the relative pronoun ‘that’ close to the conjunction ‘that’, and this would be awkward. So it were better to say:

“There is a considerable amount of evidence tending to prove that floatable minerals have the positive sign of electricity.”

“At hand” is a frill; if the evidence is known, it is ‘at hand’. “Substantial” may be a synonym for ‘important’ or ‘strong’, or ‘actual’, as opposed to illusory. It is a mistake to use a word of many meanings without indicating the particular meaning intended. REMEMBER THE READER. Also remember that all rules must give way to the main objective, which is to make oneself understood beyond a doubt. If a sentence fails in this purpose, however correct grammatically, re-arrange it. Re-consider what you want to say and start again. Do not tinker with defective writing, for by so doing you run the risk of retaining one of the defects. Good writing calls for care—persistent care; it calls for a literary conscience that refuses to be satisfied with unfinished work.

Kelley says: “There be not many so well born, well trained,

and well read, and withal so informed with the spirit of goodness and beauty, as to be effectually called to the higher ranges of literary expression; and even for such there is no short and easy road—though there is indeed a royal road—to their destination. But there are, and will continue to be, countless writers of higher or lower degree who ought to do their work far better than they have done it, and far better than ordinary writers have ever done it. For all such it is important that they should at least know what to avoid; and knowing what to avoid is in effect knowing what to aim at and what to strive for. To trained workmen I do not profess to give instruction; but because in my own experience to have my attention called to an error has been so often the beginning of an effort henceforth to avoid it, I have confidence that many other sincere workmen will be interested and helped if I make them think of faults to which they have paid little attention hitherto”.

I quote this with keen pleasure because Mr. Kelley says, better than I can, what I wish to say.

IX. PREPOSITIONS AND PREPOSITION-VERBS

The function of a preposition is to show the relation of one thing to another; it is necessary therefore for the writer to select the preposition that indicates the particular relation, otherwise he will fail to express himself clearly.

Is it **against** common sense to suggest that a Government is justified, morally as well as constitutionally, **in** preventing the decay of an industry by insisting **upon** the amalgamation of the prosperous **with** the needy?

All these seven prepositions are used correctly.

With the first dredge introduced in Russia, of Werf Conrad, Haarlem, make, this method of alluvial mining became important.

Here the prepositions "with", "in", and "of" are used wrongly. He means:

"This method of alluvial mining sprang into importance shortly after the first dredge, made by Werf Conrad of Haarlem, was introduced into Russia."

The statement itself is not true, but for that I am not responsible.

Once, while I was serving **with** him, we were frozen **in out of** sight of land **in** the Gulf of Pichili **in** the North of China.

Admiral Fisher wrote thus. He has used nine prepositions in making this brief statement. The sequence of three prepositions "in out of" is particularly awkward.

Lounsbury says:

One might fairly infer from the way in which it [newspaper English] is often spoken **of that with** the steadily increasing circulation of this sort of periodical literature there is no hope whatever for our speech.

"Of that which" is lamentable. The construction is thoroughly bad, and it is bad mainly because the misplaced prepositions have tangled the meaning. I suggest:

“From the rate at which this sort of periodical literature is steadily increasing and from the way in which it is often condemned, one might fairly infer that there is no hope whatever for our speech.”

The selection of a preposition should be guided by the requirements of the context and by idiomatic usage. In an uninflected language, like English, the correct usage of prepositions is a test of one's familiarity with the language, and long after a foreigner has acquired fluency he is likely to betray himself by a slip in the selection of these little verbal links. The difficulty lies in the idioms, the right use of which is dependent upon an intimate knowledge of the language; they are “special forms of speech that for some reason, often inscrutable, have proved congenial to the instinct of a particular language”,* and, I may add, to the instinct of the particular people speaking that language. For example, most Englishmen say ‘different to’, whereas Americans as a rule say ‘different from’. Freeman writes:

Their relation to the empire was wholly different to [from] that of the slaves.

We must feel charitably towards those who think differently to [from] ourselves.

What is the great difference of the one to [from] the other?

Two of these are quoted from the ‘Daily Telegraph’ of London. The last might be changed advantageously to:

“What is the great difference between the two”, or “between them”.

Noted writer says Los Angeles is no different **than** San Francisco.

The blame for this illiteracy rests not upon the “noted writer” but upon the half-educated young man who prepared the head-lines.

Mining on the desert presented different conditions **than** [from] those in the mountains.

* ‘The King's English’, p. 161.

This error of using 'than' after 'different' is common even in writings that presumably have been edited by competent, but careless, persons. In the same article in the 'World's Work', I find these two examples:

Conditions of sea travel are different **than** [from what] they were eight years ago.

The impression that any great number of travelers are doing things much different **than** [from the way] they did [them] eight years ago.

"Different" should follow "conditions".

But the strong government which he [Alexander Hamilton] would have created was of a different type from that which America ultimately developed.

So says Cecil Chesterton. "Different" should come after "type".

'Different from' is the older idiom, and the retention of it can hardly be deemed pedantry; at least, it is a defensive, not an offensive, pedantry.* In any event, 'different to' is taboo in the United States. Another nice question is the choice of the preposition that ought to follow 'averse'; should we say 'averse to' or 'averse from'? The dictionaries quote examples of both usages. The authors of the 'King's English' say that the use of 'to' is "more natural" than the use of 'from' after 'averse'. This statement surprises me, for it ignores the derivation of the word, which is from *a* and *vertere*, to turn away or to turn from. On the other hand, we have 'adverse', which comes from *ad* and *vertere*, to turn against. It seems to me that the language is enriched by giving 'adverse to' and 'averse from' their particular duties, instead of using them indiscriminately; thus:

I am averse **from** taking such a step.

This means that I turn away from it; I am unwilling to take the step; I do not oppose it actively. On the other hand:

I am adverse **to** taking such a step.

* Op. cit, p. 162.

This means that I face the idea of taking the step; and I object to it decidedly; I set my face against it.

A soldier running to the rear is asked: "What are you running *for*?" He retorts: "You mean, what am I running *from*?"

A small boy, wet through, and clutching a fishing-rod, is asked by a farmer, "How did you *come to* fall into the pond?" Sobbing, the boy replies, "I didn't; I came to fish".

It is no wonder that even skilful writers trip. Disraeli says:

The conversations of men of letters are of a different complexion **with** the talk of men of the world.

"the conversations . . . are of a complexion different *from* . . ."

Hallam says:

This inspired so much apprehension **into** printers that they became unwilling to incur the hazard of an obnoxious trade.

"This inspired printers *with* such apprehension that . . ."

A. C. Benson says:

I want to learn to distinguish **between** what is important and unimportant, **between** what is beautiful and ugly, **between** what is false and true.

One does not distinguish 'between' what is beautiful *and* ugly or 'between' any other single thing; one distinguishes between what is beautiful and what is ugly; but what he really wanted to do was to distinguish the beautiful *from* the ugly, and the true *from* the false.

The constitution exhibits a broad-minded tolerance in **permitting** [granting] the right to work of anyone.

He means "granting anyone the right to work".

A metallurgist writes:

The two kinds of flotation concentrate are conducted **through** [in] concrete launders to the elevators.

A mining engineer says:

We must offer a protest **over** [against] this latest suggestion.

A trade-paper remarks:

When the price of brass is increased somewhat **to conform to** [in conformity with] a reasonable advance in the quotation on raw copper.

Has it ever occurred to you that there is a general change in the relationship of the big corporations **and** [to] the general public?

One could say also, "in the relationship *between* the big corporations *and* the general public".

The use of the appropriate preposition is essential to perspicuity. "One virtue of style is perspicuity", says Aristotle.

If you speak of a distant city it may be regarded as a point, so you say:

Jones is **at** Tucson.

But if the city is so large that you regard it as an area, you say:

Jones is **in** New York.

Similarly if you are speaking of the place in which you happen to be, you do not regard it as a point but as an area, so:

Jones is **in** San Francisco.

'Of' is not required after 'inside', 'outside', or 'alongside.'

Alongside **of** this eccentric and disturbing force.

Outside **of** the market for military uses, a premium can be obtained for electrolytic zinc.

The boat was moored alongside **of** the wharf.

When he found himself inside **of** the lines, he felt safe once more.

In the four preceding quotations the "of" is unnecessary.

'Of' is not required after 'all'.

All **of** the men refused to work.

He expected to roast all **of** the ore.

I saw [them] all **of the men**.

The whole of the [entire] staff resigned.

An engineer protests:

Under [In] these circumstances I refuse to accept your proposal.

'Been *to*' is an ugly colloquialism.

I have **been** to South Africa.

He was **up** to New York last week.

A veteran recalls old days:

This led to my **first** introduction to that firm, the best known British firm in the country, and **whom** I subsequently returned to work **for in** after years, and have since kept **up** a close professional connection **with**.

Here are several misplaced prepositions. He could have added to the interest of his statement by giving the name of the firm, thus:

"This led to my introduction to Brown, Jones & Co., which is the best-known British firm in the country, and one for which I worked in after years; indeed, I have maintained a close professional connection with Brown, Jones & Co. to this day."

A superintendent writes:

It was proposed to widen the blades 7 to 11 inches.

What this statement means is uncertain, because the necessary link between its two parts is lacking. It might mean that the width is to be increased by any amount from 7 inches up to 11; or, that the present 7-inch blade is to be widened to 11 inches. The reader might be able to infer the right meaning from his general knowledge of these things or from the context; but the sentence itself ought to make the meaning unmistakable. After "widen the blades" it should read "from 7 inches to 11 inches".

Mexico had practically unlimited quantities [reserves] of untouched petroleum **which** [that] under Diaz's administration were **free for** [open to] exploitation, but which, under the recent regimes, have been closed to the world.

An ungainly use of 'with' is a characteristic of careless writing. This useful preposition is compelled to perform many

duties other than those to which it is appointed by idiomatic usage. In preparing my second lecture I had written: " 'Certain' is a word *with an* uncertain meaning", but I changed "with an" to 'of'.

A common error is to use 'with' in place of 'when'.

With [When] this circular vibration [was] imparted, the screen-wire did not push directly against the material lying on the screen.

Even **with** slimes that settle well **with** lime, this method is undesirable.

He meant: "This method cannot be recommended even if applied to a slime that is made to settle by aid of lime".

With the new furnaces in operation, smelting **with** the cheapest fuel, **with** cheap power from waste gases, and **with** the Pierce-Smith converter operating, the plant will be completely up to date.

This is journalese of the worst kind; he meant to say:

"When the new furnaces are in blast, when the Pierce-Smith converters are in operation, when cheap fuel is used, and when the waste gases are utilized to generate power, this plant will be thoroughly up-to-date."

In the 13th book of the 'Say of Confucius' it is recorded: "On matters beyond his ken a gentleman speaks with caution. If names are not right, words are misused. When words are misused, affairs go wrong. When affairs go wrong, courtesy and music drop, law and justice fail. And when law and justice fail them, a people can move neither hand nor foot. So a gentleman must be ready to put names into speech, to put words into deeds. A gentleman is nowise careless of words".

Here are a number of examples showing how 'with' is misapplied:

The lode has a north-east strike **with** [and] an easterly dip.

The rocks have been folded, **with considerable faulting** [and considerably faulted].

The vein becomes richer **with** [in] depth.

It might be better to say: "The vein appears richer the deeper it is mined".

It can be done **with** [at] small expense.

The formation consists of sand **with** [of] a greenish color.

The bodies of the sacrificial victims were eaten **with** [according to the] prescribed ceremonial.

As it stands, one might infer that the "prescribed ceremonial" was spinach!

This machine does exceptionally good work **with** [if applied to] high-grade ore.

They made brick **with** [of] clay that contained gold.

The various mines of the company are connected with the town of Triunfo **with** [by] a narrow-gauge railroad.

With [Under] the proposed law, it may be necessary to take up a hundred acres.

The peon is a faithful and steady worker **with** [under] a just and strong boss who understands him but lazy and worthless **with** [under] a weak or unjust one [boss or supervisor].

The uncertainties inherent **with** [in] any method of this kind.

With the failure to produce satisfactory coke, it was decided to smelt **with** coal, and a new plant was designed **with** much larger furnaces.

Here are three 'withs', each used in a different sense. The second one is doing proper duty; the others need substitutes.

"Upon the failure to produce satisfactory coke, it was decided to smelt with coal, and accordingly a new plant that contained much larger furnaces was designed."

All-sliming is necessary in Mexico **with** [for the treatment of] silver ores, as at Kalgoorlie **with** [for] telluride ores; but it is unnecessary **with** [for] the majority of gold ores.

In Mexico, **with** [for the treatment of] silver ore, amalgamation was only partly successful.

A boy hung the new sheets on [during] the day-shift.

The reference is to the starting-sheets in an electrolytic zinc plant. "On the day-shift" is idiomatic, but it is awkward when accompanied by "hung".

Some verbs connote direction, and therefore do not need a preposition; thus:

The mineral particles dropped **down** through the emulsion.

The bubbles rose **up** through the pulp.

He descended **down** to the lowest level of the mine.

They traversed **across** the plains of northern Tibet.

In these four examples the prepositions that follow the verbs should be deleted.

Accepted idiom requires certain prepositions to follow certain nouns, adjectives, or verbs. The following list is far from complete, but it may prove suggestive and useful.

Abound in	Indifferent to
Accord with	Invest in a business
Account for	Invest with a title
Acquiesce in	In view of circumstances
Adhere to	With a view to a purpose
Adverse to	Join in a game
Averse from	Join with something
Agree with a person	Labor at a task
Agree to a proposal	Labor for a person
Alien to	Labor in a good cause
Aware of	Labor under a difficulty
Capable of	Live by labor
Capacity for	Live for riches
Commence by doing something	Live on an income
Commence from a point	Look after a business
Commence with an act	Look at a thing
Compare with	Look for a missing article
Concur in an opinion	Look into a matter
Concur with a person	Look over an account
Consist in (definition)	Necessary for a person
Consist of (composition)	Necessary to do
Conversant with	Need of
Demand for a thing	Overcome by entreaty
Demand of a person	Overcome with fatigue
Differ from	Parallel with
Different from	Perpendicular to
Embark in a business	Point at a thing
Embark on a ship	Point to a fact
Fill with	Possessed of wealth
Full of	Possessed with an idea

Preference for	Relieve with a tint
Proceed against a person	Responsible for an action
Proceed to an act not previously started	Responsible to a person
Proceed with an act already started	Responsibility of a position
Provide against ill luck	Result from an event
Provide for a contingency	Result in a failure
Provide oneself with something	Result of an investigation
Pursuant to	Satisfaction in an improvement
In pursuance of	Satisfied of a fact
Ready at sums	Satisfied with a little
Ready for a journey	Secure against attack
Ready with a reply	Secure from harm
Reckon on a result	Secure in a position
Reckon with a contingency	Suited for a part
Reckon with a person	Suited to an occasion
Regard for a person	Tamper with
With regard to a subject	Tinker at
Regard for one's interest	Tired of a thing
Relief to suffering	Tired with exercise
Relieve of a duty	Versed in
	At variance with
	Wary of a danger

Intransitive verbs are made to seem transitive by attaching a preposition. This is because a peculiar idiom of modern English permits an intransitive verb with its dependent prepositional phrase to be turned into a passive construction, in which the noun of the prepositional phrase re-appears as the subject, the verb takes the auxiliaries of the passive voice, and the preposition is left hanging to the verb as an adverbial modifier. The verb thus seems like a transitive verb.

I shall not interfere with his plans.
His plans were not interfered with.

The linking of a preposition with a verb may give it an entirely new meaning; for example, to 'dispense' and to

'dispense with'. A judge was about to retire from the bench and was given the honor of a public banquet at which prominent citizens eulogized his services to the community. One of the speakers congratulated the judge upon the way in which he had "dispensed with justice" for thirty years!

Our language is full of preposition-verbs, many of which have a meaning of their own, distinct from that of either member of the compound. In some cases the preposition precedes the verb and has been merged with it; thus we have such words as 'withstand', 'overflow', and 'undermine'. 'Keep up' is used as a synonym for 'maintain', whereas 'upkeep' is used for the corresponding noun. A host of childish combinations of this type are used in ordinary conversation, such as 'fill up', 'fill in', 'fix up', 'melt down', 'melt up', 'work up', 'work in', 'meet with', 'keep out', 'keep in', 'break up', 'break down', 'shake up', 'shake down'. The fact that 'up' and 'down' can be used without changing the meaning indicates that the preposition has lost its significance; indeed, much of this is baby talk, entirely unsuited to technical matters; it should be shunned in serious writing. When discussing technical subjects it will be found that words of Latin (sometimes Greek) origin help to make nice distinctions of meaning and produce the precision for which we strive continually. The short and simple Anglo-Saxon may suit the poet's purpose, but the engineer will discover that many old-fashioned English words have associations and meanings unfitting them for his special use. This applies particularly to the numerous preposition-verbs, which, idiomatic though they be, and forming an essential part of our colloquial speech, should be avoided or used sparingly by the technical writer. They came into every-day use long before modern science was developed and they carry with them a looseness of meaning that renders them unfit for our particular purpose. Note the following equivalents:

Call for	Demand, require
Carry out	Perform, conduct
Come out from	Emerge
Come together	Converge, meet
Deal with	Treat, discuss
Decide on	Select
Do away with	Discard
Draw out	Extract
End up	Conclude
Fall off	Decline, decrease
Force away	Repel
Go into	Investigate, examine
Go up	Ascend
Go on with	Continue
Keep up	Maintain
Keep out	Exclude
Look for	Anticipate, expect
Look upon	Regard
Make up	Compose
Make use of	Utilize
Make up to (for?)	Compensate
Prove up	Confirm
Push forward	Impel
Put in	Insert
Put up with	Endure
Reach up to	Attain
Refer to	Mention
Result in	Cause
Result from	Ensue
Speed up	Accelerate, hasten
Try out	Test
Work out	Devise, exhaust

These synonyms remind me of the philosopher who contended that there were two natural forces: one that tended to pull everything down, and one that tended to pull every-

A reviewer in the 'New Republic' begins a paragraph thus:

He had met with [found or seen], in China in 1803, an old commentary of one of the books of Confucius.

Here are six prepositions tumbling over each other. Note the consecutive use of 'in' and 'of' twice. The noun "commentary" should be followed by the preposition 'on'.

As an editor I have reason to be convinced that the excessive use of preposition-verbs is a serious obstacle to precision in writing. The habit of using them is more British than American, but it is a hindrance to perspicuous writing wherever the English language is spoken. 'Punch' published a series of cartoons to show "What our artist has to *put up with*". Even cultivated Englishmen sometimes trip over their prepositions, largely because they employ so many preposition-verbs, which require cautious use.

There must be men in the House [of Commons] who see that of all the evils the Constitution can suffer **from** rash legislation is the most dangerous.

'To suffer from' is idiomatic, but you will note the confusion caused by the misplacing of 'from'. In speaking, "from" is pronounced immediately after "suffer", and a slight break is made before "rash", but in reading "from" appears to be linked with "rash legislation". He meant to say:

"There must be men in the House who see that, of all the evils threatening the Constitution, the most dangerous is rash legislation."

'The Times' says:

Gladstone, with all his exalted and sincere sense of truth and duty, was occasionally afflicted with the kind of lie **which** [that] Plato thought the worst of all—the lie [of] which the liar is unaware **of** because it is inside the soul.

I quote from 'The Times' again:

When the movable types invented by Pi Shing were found too troublesome to **work with** the Chinese went back to printing from wooden blocks.

with which an edition of their classical books had been published as early as 922, and which are still in use.

The phrase "work with" runs into "the Chinese", so that the idea of working with them crosses the mind. Moreover, the "work with" jars against the "with which" in the next clause.

I am aware, of course, that Shakespeare can be quoted in defence of such a placing of the preposition; for example:

What a taking was he in when your husband asked what was in the basket.*

I have a letter from her
Of such contents as you will wonder of.†

One can find examples of similar usage in the writings of Addison, Goldsmith, Jane Austen, Ruskin, and Stevenson, as shown by Professor Hill,‡ who is no mean authority on the subject; but, on examination, it will be found that the examples cited usually represent colloquial expressions. In technical writing the preposition-verbs do not conduce to the precision that is essential to our purpose. Shakespeare's characters spoke naturally; so they spoke imperfectly. Talk is habitually careless, even among the literate; it is a mistake therefore to use conversation as a model for writing. I can find no warrant for citing colloquial slips as guides for correct usage in deliberate writing.

The 'Westminster Gazette' says:

One of the conclusions at which Lord Rosebery has arrived at in the study of Dr. Johnson is that he would have made a splendid journalist.

It seems to me that a "splendid journalist" would not have used his prepositions so carelessly. Delete the second "at".

The use of coal-dust, to be fired directly in the cylinders, was also aimed at.

* 'Merry Wives of Windsor,' Act. III, sc. 3.

† Ibid., Act. III, sc. 6.

‡ 'Beginnings of Rhetoric and Composition', by Adams Sherman Hill, pp. 489-490.

It may be that the use of "fired" suggested the employment of "aimed at"; the coal dust is not shot into the cylinders, it is only set on fire there. Here "aimed at" means 'proposed' or 'intended'.

E. F. Benson writes:

Lucia flicked off **with** the tassel of her riding whip a fly that her mare was twitching its skin to get rid of.

Evidently he forebore from writing 'her skin', because it might have suggested that the lady Lucia, not the mare, was annoyed by the fly.

Hilaire Belloc writes:

First, as to the points the bombardment of which from the air one reads of almost daily in the present development of the aerial offensive by the Allies—which, by the way, is proving the increasing superiority of the allied air navies.

What a prepositional bombardment!

American authors make similar blunders; for example, William Dean Howells concludes an article thus:

This is the climax I have been working up to, and I call it a fine one; as good as a story to-be-continued ever ended an instalment **with**.

He makes a childish anti-climax by using an insignificant preposition as his last word. Here is another example of this rhetorical error:

It is palpable that radical revision of laws, which have diverted so many millions of dollars into the pockets of the non-producing legal fraternity, is called **for**.

He might have said:

"There is palpable need for a radical revision of the laws that have caused so many millions of dollars to be directed into the pockets of the non-producing legal fraternity."

An editorial paragraph on the New York mayoralty election ends thus:

It was a case of any stick being good enough to hit Hylan **with**.

So a fervid statement ends in an anti-climax, for the "with" is a meaningless little word when placed where it does not

belong. It belongs somewhere before "to hit", for the idea is 'with which to hit Hylan'. The "with" can be omitted entirely or the sentence changed to:

"Any stick was good enough for hitting Hylan."

Nor did any of them describe a practical form of apparatus for conducting the proposed operation in.

He means "an apparatus in which to perform the operation", but became confused by using "for". He might have written, simply: ". . . a practical form of apparatus for the proposed operation".

Woodrow Wilson said:

One can feel sure that Franklin would have succeeded in any part of the national life that it might have fallen to his lot to **take part in**.

The use of "part" in two senses is confusing. He meant:

"One can feel sure that Franklin would have succeeded in any branch of our national life."

The same distinguished writer said:

If there should be disloyalty, it will be **dealt with with** a firm hand.

"Dealt with" stands for 'suppressed'.

Presumably equal **to**, but actually next, in rank . . .

The "to" is not needed. Be careful of the prepositions when you interject a clause.

A further investigation was **dispensed with** [considered unnecessary].

The residue, amounting to about 70% of the original weight of the shale, must be **disposed of** [discarded] as **valueless**.

The ruling by the Land Office that diamond-drilling would count as expenditure on a patent was helpful, and will be **taken advantage of** by many shale companies.

It were better to say, "and advantage of it will be taken by".

The foregoing examples show how often the preposition that is tied to a verb is followed by another preposition, making an awkward phrase, difficult to read and sometimes difficult to

understand. Moreover, the preposition belonging to the preposition-verb must be kept close to its mate, otherwise it may become, as it were, 'lost in the shuffle'. The ending of a serious statement with a preposition is a rhetorical blunder; such a statement is made impressive if it ends with a significant word—a word that is apt or conclusive.

The preposition-verb is idiomatic, as I have said; so also sometimes is the placing of the preposition at the end of a sentence; our language derives these idioms from the Anglo-Saxon or Low-German part of its origin. In German one says: "*Machen Sie die Thüre zu*". Old-fashioned people in western England still say, "Shut the door to"; and a Cornish miner will say, "Where be going to?". The emphasis gained by placing a preposition at the end of a statement survives usefully in such a phrase as "Just now Russia is a good country to come from". This was written by an engineer who had arrived from a copper mine in Siberia, where disorder was rife. The statement as made is not only idiomatic but highly expressive, for the three significant words in it are 'now', 'Russia', and 'from'. Of these the last is the most significant, and it gains in emphasis by being placed last. In such sentences the preposition has an adverbial value, as also in

He has gone out.

He told me to sit up.

In my first lecture I quoted Huxley. You will remember what he said of a writer who used big words needlessly: "He will be afraid to wander beyond the limits of the technical phraseology which he has got up". Here "up" is adverbial. It ends the sentence awkwardly. "Got up" might be replaced advantageously by 'prepared', or 'concocted', or 'learned'. On this matter Professor Hill says: "A good author does not hesitate to put a preposition at the end of a sentence, when, on grounds of clearness, force, or ease, he thinks it belongs there; but often, perhaps usually, he finds that it belongs *somewhere else* [elsewhere]". I submit that the shifting of the preposition

may contribute to ease, but it rarely ministers to clearness or force.

Another authority * says: "The common belief that a sentence ending with a preposition is on that account incorrect is a mistake; such sentences abound in good literature". True, but defective sentences also abound in good literature, and great writers occasionally make errors in composition. The homely usage illustrated by "shut the door to" may have idiomatic excuse, but I submit that such phrases are inappropriate to careful speech and precise writing.

A preposition-verb is followed often by another preposition because the prepositional part of the verb has ceased to function as a preposition.

As regards the miners, a much more serious prospect of social disaster has been, it was hoped, **done away with** [prevented or obviated].

The preposition was **agreed to** [accepted or approved] **by** all.

The plan **decided upon** by the company was to re-design and re-equip the concentrator.

This is puerile.

"The company decided to change the design and equipment of the concentrator."

Robert K. Duncan writes:

It should be the young man's business to learn all the chemistry and cognate knowledge that he can lay his hands **upon in** the laboratory; and his brains alongside **of in** the study library.

This quotation is full of literary atrocities; note how the prepositions jostle each other.

An engineer writes:

The gold-mining industry which the Government **looks to for** its supply of gold.

The "to" should precede "which".

Another engineer writes:

The cleverest man I **came across** [met] **in** my travels . . .

In this part of Mexico the more vitreous rhyolites are **met with**.

* E. C. Woolley, in his 'Handbook of Composition', p. 37.

This suggests an encounter with a band of Yaqui Indians on the warpath. One might substitute: "In this part of Mexico the more vitreous type of rhyolite is common", or "The vitreous type of rhyolite is found in this part of Mexico". But "met with" does not convey either of these meanings; it says nothing; so perhaps "are met with" should be replaced by 'occur', which itself is a vague word.

The sulphides **came in on** the next level.

"Sulphides began to appear on the next level."

This plan is being **carried out** [followed] **on** the Violet claim.

"This method of work is being applied on the Violet claim."

They are **piled on to** the thickness of six or eight inches.

"They are piled six or eight inches thick."

The "on" is redundant, because 'piling' means the heaping of things upon one another.

The tar by-product was difficult to **dispose of to** the tar-distillers.

"It was difficult to market this tar by-product among the distillers" or "to sell this by-product to the distillers".

Three separate tests were **carried on** [made or performed] **in** this apparatus.

An authority on the art of writing says: "What should we *aim at in* learning to write English?" My reply to him is that, among other things, we should aim to avoid the unnecessary preposition-verbs, thus: "What should be our aim in learning English?"

Another metallurgist writes:

The ore is hard and requires to be **shaken up with** [loosened by] powder.

The final decision was not **arrived at** [reached] **for** several hours.

Classification was exhaustively **dealt with in** his book.

"Classification was discussed exhaustively in his book."

Those who have **gone in for** [undertaken] serious work . . .

Oil can be **made use of** [utilized] to float mineral.

The output has been much **interfered with** [hindered or curtailed] **by** political disorder.

As an illustration of how the activities of corporations affect our daily life, I thought it would be interesting to find out how many people were employed by the corporations I would have to **deal with in** coming from New York to Denver.

This is quoted from an experienced writer. He might have said:

“To illustrate how the activities of corporations affect our daily life, I thought it would be interesting to ascertain how many people were employed by the [railroad] corporations with which I would have to deal in coming from New York to Denver.”

The ore is broken **along with** the barren rock.

“Ore and barren rock are broken together.”

Over against this pessimistic report, we have the sanguine opinion of Professor Smith.

Delete “over”, or substitute ‘as’.

When oil is shaken **up** with water or some [other] liquid with which it is miscible, an emulsion is formed.

The oil, owing to its specific gravity, would rest on top of the water before the commencement of the agitation to which reference is made; moreover, the agitation would have the effect of shaking it down, not up.

An author on the metallurgy of zinc writes:

These methods **tie in with** the process of electrolytic extraction. In the case of zinc-lead ores, moreover, everything **ties in with** the methods of lead extraction. Therefore is perceived the need of perfect metallurgical coördination. Starting with the mixed ore, the desideratum is to get the maximum of value out of it, without reference to whether more or less is eventually to appear through the lead works or the zinc works. Some very earnest thought is pursuing these lines.

Another desideratum is to write English that does not simulate the refractory nature of a complex zinc-lead ore. We hope some earnest thought, potent for clarification, will not

only pursue "these lines" but overtake them, lest they wander too far into the morass of verbiage. If a method *ties in with* a process and if everything *ties in with* a method, what does 'tie in with' mean? Apparently to 'adapt' or 'connect' one with the other for the purpose of "metallurgical coördination". What he means exactly, one cannot tell; I venture to suggest: "These methods can be used in conjunction with the electrolytic process. As regards zinc-lead ores, moreover, they suit current methods of extracting the lead".

The permission to go on with [continue] their business . . .

I submit that the consistent way of meeting the want is for such a reserve to be **provided for** in the initial capitalization.

He is entangled by his preposition-verb; he means: "I submit that the proper method is to provide for such a reserve when arranging the original capitalization".

This matter **has been dealt with** [was discussed] in my last chapter.

From the foregoing examples it should be evident how unnecessary are most of these preposition-verbs, especially in technology, in which single-word verbs of more precise meaning are desirable and available. Much of the trouble is caused by an affected squeamishness about using the personal pronoun, thereby forcing the use of quasi-passive verb phrases. Thus it would be better to say:

"I have discussed this matter in my last chapter."

Preposition-verbs are woolly in their texture; they contribute to abstract phrasing.

Mines where sampling **results in** [gives] an incorrect subnormal value . . .

This is jargon. "Where" should be 'in which'. 'Value' is a word that needs to be qualified if it is to be significant. He means:

"Mines in which, by ordinary methods of sampling, the ore is likely to be under-valued . . ."

Some of the misplacing of prepositions is caused by separat-

ing the preposition from the relative pronoun to which it belongs, as in

This is kind of you; I cannot find words to thank you in.

He means "in which to thank you". He might have omitted the "in" without spoiling the sense.

The properties which it now consists of are many old and new claims.

The "of" should precede "which"; he means: "The properties of which it now consists include many old and new claims". He might say: "The property now includes both old and new claims".

These are matters which the Chamber of Mines might with profit devote a few minutes to.

The "to" should precede "which". Even then the sentence would be roundabout; he might say: "These are matters that the Chamber of Mines might well consider".

The discrepancies between sampling estimates and actual recoveries, [of] which Mr. Hutton speaks of in his article . . .

Writing on a subject one is interested in is a fascinating entertainment which I have often indulged in.

The entertainment must have been his alone if he wrote like that. The last "in" belongs to the "which", thus: "Writing on a subject that is interesting is a fascinating entertainment in which I have indulged often".

Gilbert M. Tucker remarks:* "Another peculiarity of recent British speech and literature is the insertion of superfluous words that an American speaker or writer would never think of putting in". As an illustration he quotes from Henry J. Nicoll:

Every critic occasionally meets in with works of great fame of which he cannot appreciate the merit.

Mr. Tucker is mistaken; the error to which he refers is common among us; like other errors of speech it prevails on

* 'American English', p. 45.

both sides of the Atlantic. Indeed, the jibe "Physician, heal thyself" can be thrown at the authors of textbooks on writing, this one of mine included, of course. It is extremely difficult to be consistently correct. For example, Professor W. T. Brewster, in 'Writing Prose English', speaks of 'win out' as an "annoying redundancy", yet himself writes: "No logical case can be *made out for* capitals, except the capital at the beginning of a sentence, which *helps out* the preceding period". In the same book I find:

Many people [to] whom he listens to or reads.

To learn to write it is necessary to **keep on** writing.

Technical writers appear to use an extra preposition with the idea of obtaining emphasis.

He tested out the process.

He is sure to win out in this competition.

Reverting to Mr. Tucker and his book on 'American English', I venture to say that the effort made by him and by others like him to prove that either the British or the Americans speak or write more incorrectly one than the other is a sheer waste of time and an unnecessary trespass upon the goodwill of the English-speaking peoples. Mr. Tucker himself uses the phrase "our knowledge of Pennsylvania provincialisms". This use of the name of a region in place of the corresponding adjective (Pennsylvanian) is itself a provincialism, into which the scribes of the daily press are prone to fall:

A great Italy battle [in Italy]

Greeks wrest big Asia [Asiatic] area from the Turks.

Africa [African] missionary has difficult task.

We agree with Mr. Tucker when he remarks, incidentally: "However, the *tu quoque* argument is unconvincing and unsatisfactory at best; and it is admittedly impracticable to substitute any very instructive comparison between either the fashionable or the literary language of the two countries".

I note that 'Colonel' House "sat *in* with the Big Four"

during the Peace Conference; and more recently I heard a man say, "Jones lost my umbrella *on* me". Another remarked, "My clients have been holding *out on* me"; meaning that they had been withholding their support.

A New York newspaper says:

When we first joined *out with* the Allies . . .

He joined *in with* the others.

These are feeble efforts to obtain emphasis. Again:

Many miles of the railway were constructed and connected *up with* the old line out of Messina and Alexandretta.

The "up" is redundant, if not worse.

My advice was to throw the proposition *up*.

He means to "reject the proposal".

A raise has been *put up* to the surface.

The sinter cools *off* and disintegrates.

C. W. Barron, in the 'Boston News Bureau', writes:

Governments in Europe are breaking *up*. Governments in Mexico are one after another breaking *down*.

Does he mean that the change from the Czar to the Bolsheviks is upward and from Diaz to the Villistas downward? *Quien sabe?* The feeble prepositions are loaded with too much social philosophy. "Are" ought to follow "another".

The particles of mineral may become attached to air-bubbles by means of which they are floated *up* to the surface.

They do not 'float' until they are *on* the surface. He means that they rise. He could say that they are 'levitated'.

To make sure that the heating *up* and the cooling *down* of the emulsion does not produce a bad effect.

Here the prepositions serve to emphasize the verb in a feeble kind of way. They are redundant.

The oil and water are fed *in* at the centre and *thrown out* [discharged] at the circumference.

To 'feed' is to put something into something; the "in" is not needed after "fed".

The flask containing the extract was placed in a water-bath; after most of the ether had been distilled off, the residue was transferred to a small separating-funnel of known weight.

To 'distil' is to drive off as vapor.

Work just enough to draw down a day's pay . . .

This is colloquial. Also these:

He has used up all his supplies of coal.

The traveler who does not study up his map . . .

The electrodes will penetrate close to the bottom and heat it up.

A great deal of electrical energy is wasted in heating up the carbon.

It is well to melt down the lead.

The next process consists in melting up the copper.

This is child's talk. 'Down' and 'up' are of equal value; that is to say, they are of no value.

Frequent unequal heating up of the roof of the furnace . . .

He ordered the men to fill up the tank.

He filled in the vat with cyanide solution.

The Grand Bonanza mine is to be proven up on by H. C. Mieli.

Yes, preposition-verbs are idiomatic, they are part of our language, but they should be used sparingly in technology, which cannot suffer careless colloquialisms without serious loss of clarity. It may be proper to settle down in the country in order to settle up one's debts in the city. Some of these preposition-verbs are not to be dispensed with lightly, but the technical man should not melt down a charge and melt up a slag, nor should he test out a process or prove up an orebody, unless he means that his readers must put up with his vagaries. He ought to do away with these meaningless little obstacles to clear speech. In German such preposition-verbs are compounded, and in English it might help if we 'shut-down' a mill or 'opened-up' a mine. We need do neither, however, because a more explicit term is available. Try for yourself. You need not take the word of the pedants. As an editor, I can assure you that the habit of

employing preposition-verbs, and the consequent liability to misplace the preposition, will hinder you in the acquisition of a style suited to the discussion of technical subjects.

I have said enough concerning the use of prepositions; I trust that you will pay more attention to this detail; if you do, you will, I feel sure, learn to write more clearly. In my own writing I have found attention to this matter a great help, and that is why I have discussed the subject at some length. Above all, remember what the old lady said: "A preposition is a poor thing to end *up* a sentence *with*".

X. HYPHENS AND COMPOUND WORDS

A severely technical article, however well written, can not be an agreeable form of literature. It suffers from the defects of its qualities. One defect is a congestion of language, due to a multiplicity of adjectival nouns. The sentences are packed with words of unpleasing sound, charged with complex ideas, crowding one another so closely that the phraseology moves like an ice-pack in Bering Sea or a log-drive in a river; the undercurrent of meaning may continue to move, but the surface is obstructed.

This verbal congestion is made evident by ugly compoundings, many of which are adopted by the technical writer in the mistaken belief that they give directness to his statements. For example:

A unanimously approved scheme

“A scheme unanimously approved”

The continuous temperature record

“The continuous record of temperature”

To stimulate interest in synthetic plant construction

“To stimulate interest in the construction of synthetic plants”

In smelters reverberatory-furnace firing with powdered coal has been practised for a decade.

“In smelting, the firing of reverberatory furnaces with powdered coal has been practised for a decade.”

A tar consumption of one pound per ton

“A consumption of tar at the rate of one pound per ton”

A mechanical ventilating system

“A system of mechanical ventilation”

The oil, or certain of its surface tension lowering constituents, has been removed from the water.

“The oil, or some constituent that lowers the surface-tension, has been removed from the water.”

The index of efficient gold treatment

“The index of efficiency in the treatment of gold ores”

The Kolchan power plant fuel consumption has averaged 3500 cords of wood per season.

“The consumption of fuel at the Kolchan power-plant has averaged 3500 cords per season.”

Every possible material and labor saving device

“Every possible device for saving material and labor.”

A common practice is to compound two nouns, making the first adjectival, thus:

The bureau of Mines made a study of **fume losses** [losses in fume].

This is done to prevent **edge wear** [wear at the edges].

The **rubber belt** manufacturers [of rubber belts] have shown great interest in the subject.

The assay is given a **borax glass** cover.

A hyphen between “borax” and “glass” would help to clarify the statement, but it is better to avoid the adjectival use of ‘borax-glass’ by saying “a cover of borax-glass”.

The **appraisal system** is technically an admirable one.

“The system of appraisal is admirable technically”.

The **crude elevator belt** has the most severe duty.

The elevator-belt is not made of crude material; the reference is to the crude ore that the belt-elevator lifts from one floor of the mill to another.

An advertiser makes the claim:

We are one of the pioneers in the manufacture of **electric furnace iron castings**.

He means:

"We are pioneers in the manufacture of iron castings by means of the electric furnace."

A writer on flotation says:

In constructing surface tension concentration curves it is necessary to . . .

"In constructing curves that represent the results of concentration by means of surface-tension methods, it is necessary to . . ."

A metallurgist writes:

Experiments on the ore had shown that the chloridizer was expelled in muffle tests before appreciable quantities of the silver could be volatilized.

He refers to metallurgic tests that he made in a muffle; delete the words indicated and insert 'in muffles' after the word "ore".

The difference between surface-tension measurements for water and water and sodium oleate mixtures

The 'ands' are confusing; so also is the compounding; he means:

". . . measurements for water and for mixtures of water with sodium oleate."

The telegraphic style readily becomes cryptic, if not chaotic. For example:

Oil exploitation in Canada is confined to British registered companies.

Does he mean companies of British register or does he mean British companies registered in Canada?

A man's appetite is something phenomenal under the conditions of Canadian wilderness travel.

He means "when traveling in the Canadian wilderness".

A typical copper flotation tailing screen and copper analysis follows which illustrates this point.

What a jumble! He means:

"A screen-analysis, with assays, of the flotation tailing from a typical copper ore will illustrate this point."

Chlorite is present as a **persistent alteration product**.

Is it a product of persistent alteration or a persistent product of alteration?

The machine that weighs the **mixed ore and concentrates charge**

Here the five words before "charge" constitute an adjectival phrase; the meaning is held in suspense too long, and the effect is confusing. I suggest:

"The machine that weighs the charge of ore and concentrates"

The charge obviously is a mixture.

Allow a full air draught [draught of air] to pass through.

Mine sampling is never an easy task.

Does he mean the sampling of a mine for the purpose of appraisal or does he refer to routine sampling in a mine?

The **vein course** [course of the vein] was indicated by a mere seam.

The book has as its underlying theme a study of **fuel oil power plant operation**.

He means:

"The book is devoted to a study of the operations incidental to the use of fuel-oil in power-plants."

If this be the usual 100 lb. can all that is necessary is to unscrew the cap.

A hyphen after "100" makes clear that it measures the capacity of the can; thus:

"If this be the usual 100-lb. can, all that is necessary is to unscrew the cap."

A paper on the retraining of demobilized soldiers

"Retraining" suggests the opposite of 'detraining'; he means re-training, or training them again.

The treatment involved an overall cost of \$2.54.

'Overalls' are garments, and the price of them is not far from \$2.54, so that it might be supposed that "the treatment" involved excessive damage to the worker's clothes. He means an 'over-all', or total, cost.

He has been instructed in first aid and mine rescue work.

The meaning emerges clearly if we insert two hyphens:

"He has been instructed in first-aid and mine-rescue work."

Technical writers are prone to say "recently designed plants" instead of "plants of recent design"; they say "locally manufactured cars" rather than "cars of local manufacture", but I can see no reason for preferring an ugly locution to a pleasing one, that is, for choosing bad English in preference to good. A geologist wrote about "preserved rock, vein, and ore specimens" when he meant "preserved specimens of the ore and the country-rock". A metallurgist referred to "a lead acetate solution drip" when he meant "a drip of lead-acetate solution". Here I have disentangled the compounding by introducing a hyphen. That brings us to another phase of our subject.

The varying closeness with which words are joined is indicated by separateness, hyphenation, and compounding. This is illustrated by such a series as 'fire insurance', 'fire-brick', and 'fireproof'. In the first we have two distinct ideas, namely, insurance against risk; in the second, the two members are joined, but not so closely as to be inseparable; we can speak of the 'brick' being heated by the 'fire'; in the third, the two words are so merged into singleness of meaning that they cannot be resolved into separate units; we do not say that a thing is 'proof' against 'fire'; there was a time when 'fire' and 'proof' were hyphenated, before the friction of frequent usage had melted them into one.

Hyphens are not pretty things, as I have said, but they are a great help in technical writing; for instance:

The crushed section of No. 2 shaft had to be entirely recovered and retimbered.

What does he mean? The shaft has been timbered again, or 're-timbered', that is clear; but has the shaft collapsed and had it to be 'recovered', that is, restored, or has only the covering of the shaft been shattered, so that it had to be 're-covered'? If he had used the hyphen in "retimbered", it would have clarified his whole statement, by giving significance to the omission of the hyphen in "recovered". I am reminded of a notice that said "Umbrellas recovered". Consider the difference—the pathetic difference—between having an old umbrella 're-covered' and 'recovering' a new umbrella, perhaps a Christmas gift, that has been lost!

Here are sundry other distinctions expressed by hyphens:

A 'single stamp-mill' is a lonesome mill.

A 'single-stamp mill' is a mill consisting of batteries of one stamp each, like the Nissen, instead of the usual five stamps per battery.

A 'single-stamp-mill' is a mill containing only one stamp, after the Lake Superior fashion, where one big steam-stamp does the work of 100 ordinary gravity-stamps.

A 'crude ore-bin' is an ore-bin of crude construction.

A 'crude-ore bin' is a bin made to contain crude ore, that is, ore as it comes from the mine, before it has been crushed, concentrated, or subjected to other preliminary treatment.

A 'crude ore bin' is an example of crude writing.

Consider the difference between

cooling floor	and	cooling-floor
sinking pump	“	sinking-pump
level floor	“	level-floor
iron furnace	“	iron-furnace
paper mill	“	paper-mill
zinc box	“	zinc-box
sample bottle	“	sample-bottle
tin plate	“	tin-plate
bent rod	“	bent-rod
melting point	“	melting-point
burning oil	“	burning-oil

A 'cooling floor' is one that is growing cold; a 'cooling-floor' is one on which hot ore is cooled; it is a floor *for* cooling. A 'sinking pump' is a pump that is sinking or subsiding; a 'sinking-pump' is a pump to be used in sinking a shaft; it is a pump *for* sinking. A 'level floor' is one with a uniformly horizontal surface; a 'level-floor' is the floor of a level in a mine. A 'paper mill' is one made of paper; a 'paper-mill' is one that makes paper. An 'iron furnace' is a furnace made of iron; an 'iron-furnace' is one used for smelting iron ore. A 'zinc box' is made of zinc; a 'zinc-box' contains zinc, as, for example, the box in which zinc is placed to precipitate gold from cyanide solutions. A 'sample bottle' is a sample of bottles; a 'sample-bottle' is a bottle to hold a sample. A 'tin plate' is a plate of tin; 'tin-plate' is iron that is plated or covered with tin. A 'bent rod' is a rod that is bent, but a 'bent-rod' is a detail of a conventional engineering structure. A 'melting point' is a point that is melting; a 'melting-point' is the point at which melting begins. A 'burning oil' is oil that is burning; a 'burning-oil' is an oil suitable for burning. A 'tailing dam' is a dam made of mill-tailing; a 'tailing-dam' is a dam made for restraining the flow of the mill-refuse. A 'hard-working man' is one that works hard; a 'hard working-man' is a tough laborer. The 'solid surface' is the surface of a body that is not solid underneath, whereas the 'solid-surface' is the surface of a solid, and this meaning can be conveyed by the aid of the hyphen, thereby obviating roundabout explanations.

The hyphen is used in place of the diæresis, thus:

co-operation instead of coöperation

co-ordinate instead of coördinate

It is used also to indicate syllabic division, as "for-mcr-ly", and to indicate the break in a word at the end of a line.

The incorrect placing of hyphens can be illustrated by a few examples:

Air transmission-pipe

It is a pipe for transmitting air, not an airy pipe of

transmission; therefore the hyphen should be transferred thus:

“Air-transmission pipe”

Dry vacuum-pump

The reference is to the dryness of the vacuum, not to the dryness of the pump; so it ought to be

“Dry-vacuum pump”

Tungsten filament-lamp

The filament is made of tungsten, not the lamp as a whole, so we say

“Tungsten-filament lamp”

The standard Merrill screw zinc-dust feeder.

The word “screw” modifies “feeder,” and the two ought to be joined.

“The standard Merrill zinc-dust screw-feeder”

This is ugly; it means that the screw regulates the feed of zinc-dust.

Stock solution-tank

The solution was kept in stock, not the tank; he meant the tank in which the stock solution was kept. The adjectival use of the compound “stock solution” calls for a hyphen, so we have

“Stock-solution tank”

Out of a single technical article I take the following examples of compound words. I shall give them to you first without the hyphens so that you may note how the meaning is jumbled, and then I shall insert the necessary hyphens so that you may see how the sense emerges.

Crushing plant conveyor belt

“Crushing-plant belt-conveyor”

The traveling belt that conveys the ore to the plant in which it is crushed.

Electric bell overhead alarms

“Electric-bell overhead-alarms”

Alarms were placed overhead, and these alarms consisted of bells operated electrically.

Ball check air inlet valves

“Ball-check air-inlet valves”

They are valves for checking the admission of air by means of balls that act automatically. It would be better to say: “The ball-check valves of the air-inlet”.

A screw conveyor chain driven from the classifier shaft

“A screw-conveyor chain-driven from the classifier-shaft”

This is a screw the turning of which moves the pulp, conveying it to another part of the mill. The screw is turned by means of a chain that is driven from the shaft that also drives the classifying machine. Thus hyphenation serves as a sort of shorthand; it is ugly but useful.

The motor is connected to the tube mill gear shaft by silent chain drives and Hill clutches.

“The motor is connected to the tube-mill gear-shaft by silent chain-drives and Hill clutches.”

This motor furnishes the power, which is transmitted to the pinion-shaft by means of a chain that engages in the teeth of the sprocket-wheel, the operation of which is controlled by a Hill clutch.

Other examples, taken from other articles, follow:

The blast furnace gas will be delivered to a bag house through 600 ft. of brick dust chamber.

“The blast-furnace gas will be delivered to a bag-house through 600 ft. of brick dust-chamber.”

These cannel coal tar oils are high in paraffine.

No clear idea emerges until a couple of hyphens are inserted thus:

"The cannel-coal tar-oils are high in paraffine."

This is clear, but it is not good English; I suggest:

"The tar-oils from cannel coal are high in paraffine."

From this base line right angled lines were extended in the direction of the dip of the vein.

'Dip' connotes direction. The sentence should be written:

"From this base-line right-angled lines were extended on the dip of the vein."

The best compound condensing poppet valve steam engine will produce an indicated horse-power hour on 12 pounds of steam.

When I read the above example I was reminded of the lady in Kansas after the tornado had passed. It is recorded that "she looked up from her washing and found the air thick with her intimate friends". The disjointed limbs of technical phraseology must be united with grammatical splints, these useful hyphens of which we are speaking. The writer of our example used one, whereas he needed four, thus:

"The best compound-condensing poppet-valve steam-engine will produce an indicated horse-power per hour on 12 pounds of steam."

A mill-man says:

As to the dressing of the amalgamated plates, he concluded that 12 hour intervals were the best.

Was it 12 intervals of one hour or was it intervals of 12 hours each? He meant 12-hour intervals. Similarly "a train of ten ton cars" leaves it questionable whether it be a train of ten one-ton cars or a train of 10-ton cars.

Now you have seen how important a function is served by the hyphen. No cast-iron rule can be formulated to cover the requirements of technical writing, but I may say to you that a varying degree of intimacy exists between words that are compounded, and that intimacy may be expressed by:

A. Mere juxtaposition or adjacency of separate words, indicating a loose connection.

B. Hyphenation, implying intimacy without an entire loss of individuality.

C. Compounds, expressing a singleness of meaning.

Thus we have 'ore deposit', 'ore-shoot', and 'orebody'. Roughly the three relations that two adjacent words may bear to each other can be represented by single blessedness, betrothal, and marriage. The hyphenated condition, like an engagement, may be broken, and a word may form a new combination with another word for which it has affinity. After a time, two words may have been hyphenated so long that they require a singleness of meaning, they are married, and are treated as a unit. For example, 'today', 'tonight', and 'tomorrow' require no hyphens. The retention of them is due to unthinking conservatism. The 'to' in 'today' has no significance aside from 'day'; it used to be 'the'. In parts of the British Isles they still say: "How are you the day?" The word 'today' expresses a single idea, and the hyphen is a meaningless survival. It has been estimated that 150,000,000 persons write these three words, 'to-day', 'to-night', and 'to-morrow', three times daily, on average, and that the omission of the hyphen would save an amount of energy in the aggregate equal to that required to propel an ordinary passenger-train round the world. Let us save the energy thus squandered and use it in placing our hyphens where they are needed.

In hyphenated couples such as 'cooling-tower' and 'leaching-vat' the first member of the couple is a gerund, which is identical in form with the present participle. The participle however is an adjective whereas the gerund is a noun that has the power to govern another noun. In such hyphenated technical terms the preposition 'for' must be understood; we mean a tower *for* cooling and a vat *for* leaching. Similarly an 'amalgamating-table' is not one that amalgamates, for it is the precious metal that amalgamates, but a table *for* amalgamating. A 'condensing-chamber' is not a chamber in the act of condensing but a chamber used *for* performing the process of condensation. A

'frothing-agent' is an agent for making froth, not one that froths.

In each of these examples the hyphen saves words; it is a means of condensing the phraseology; and so long as the meaning is not obscured it is a useful device, but the technical writer must be careful not to addict himself to an excessive use of the hyphen because it leads to the acquirement of a style that may become both ugly and obscure. Aristotle said that the use of compound words, "such as Lycophron's 'many-visaged heaven', 'vast-crested earth', and 'narrow-passaged strand'", was in bad taste. He remarked also that they were "eminently serviceable to dithyrambic poets, whose style is noisy". The moral is to avoid compounding, and to indicate the meaning of the unavoidable compounds by placing the hyphens carefully. I venture to add a few more examples to show their proper service.

The average shoe-and-die consumption in a stamp-mill

The subject is the concurrent wear of shoes and dies.

An early design of central-discharge ball-tube mill

The two hyphenated couples modify "mill". This relation would not be indicated by "central discharge ball tube-mill". It is a mill of tubular shape in which steel balls are used for grinding, the pulp being discharged through a central opening. "Ball" and "tube" modify "mill" equally.

His theory is what one might term a **resolution** theory.

This suggests that he is a man of high resolve, but the reference is to the secondary dissolving of gold. The word to be used is 're-solution'.

Mining was started at the edge of the ore on the top sub-level and carried downward level by level: this **retreating** method was desirable for two reasons.

He says what he means, the hyphen is not needed in "retreating", but it is required in the following statement:

The method of re-treating the tailing was introduced by a metallurgist from South Africa.

The meaning of 'half-way' is better expressed thus than by 'halfway'; because the hyphen is pictorial.

Lime retards the solution through **inter-action** with some soluble salt. Light house-keeping is not good for light-house keepers.

The hyphens are needed to make the meaning clear.

This is true of powdered coal fired reverberatories.

He means that his statement applies to reverberatory furnaces that are fired with powdered coal. In this last example, as quoted, the three words preceding "reverberatories" constitute an adjectival phrase. Such tumbling of words on one another has become an ugly characteristic of technical writing. It avoids hyphenation, it is true, but only at the cost of a worse construction, if anything so unsystematic can be described in such polite terms. More than any other defect, this habit renders technical writing not only non-literary but uncouth. So, take pains to avoid it, by using the necessary prepositions, by a sparing use of hyphens, or, better still, by expanding the sentence into good English.

XI. SLOVENLINESS

Slovenliness is as reprehensible in words as in clothes. Much writing that we recognize as poor in style is merely sloppy. Just as some students postpone the necessary shave or forget to change their collars, so young engineers in writing drop their articles, definite and indefinite, or omit prepositions where they are required, possibly to compensate for those they use unnecessarily

The work will begin [on] Saturday.

Influenza seriously affected many mines [during] the last three months.

Flotation in America [during] the last two years has made tremendous strides.

Construction of the mill started [on] August 12, 1915, at which time 75% of the excavation was completed.

The idea I wish to convey is [that] there are mineral deposits to which the present law applies badly.

For this reason, if **there was** [for] no other, the ownership of the ore below and [of] the surface above should go together.

When a unit of mapping is furnished, be the unit a claim or [a] group of claims, it is necessary . . .

A fully stocked store was started in Park City and all employees [were] sold merchandise on a strictly cost basis.

The word "merchandise" is left without government or agreement. I suggest:

" . . . and merchandise was sold to all the employees on a strictly cash basis."

The verb 'be' is serving concurrently both as a principal and as an auxiliary in the following:

At first the work was interesting and [was] liked by most of the men.
The sulphide ore was more complex or [was] milled at an increased cost.

The adjectival use of nouns causes a jumble, thus:

The drip of **crusher** lubricating oil could not get into the bin and mix with the ore.

He means: "The lubricating oil from the crusher could not drip into the bin and mix with the ore".

Abridgments that leave the reader to guess the writer's meaning are bad. Theodore Roosevelt wrote:

While camped on the Nzoi, the honey-birds were almost a nuisance.

Roosevelt and his party, not the honey-birds, were camped on the Nzoi. Such elliptical phraseology is slovenly. Other omissions are common.

The manganese ore is restricted to a comparatively small area on Willow creek near [the point] where it crosses the county line.

These assays **are** [represent samples] from the deepest workings.

From this gas isoprene can be made and the isoprene converted into rubber.

An auxiliary verb is omitted before "converted"; after "made" he might write, "the isoprene then being converted", but the entire statement needs to be re-written, thus:

"From this gas it is possible to make isoprene, which then can be converted into rubber."

'Such as' should not be divided needlessly.

To cope with the unemployment resulting from **such** slumps as have occurred during recent times.

It is preferable to write: "From slumps such as have occurred". He is not referring to a particular kind of 'slump' but only to those that have "occurred in recent times".

Do not omit the connecting pronoun:

Their vein is not so wide, nor the ore so rich, as [that in] the Combination.

Many mining booms such as [those of] 1906 and 1916.

A rate of drilling much superior to [that of] the old piston-drill.

Do not omit the necessary conjunction:

The idea I wish to convey is [that] there are mineral deposits to which the present law applies badly.

The failure to do this would tend to cause the ownership of a vein to be so divided [that] it could not be worked economically.

A finite verb must agree with its subject, says the rule.

One of the most brilliant contributions to geology that **has** [have] been made.

The correct form sounds awkward; the attractive form is wrong; avoid both. The clause "that has been made" is redundant. I suggest that "a brilliant contribution to geology" should suffice.

Anyone can measure with a glance when **they are** tired.

Ruskin, who wrote this, meant 'when he is tired' or 'when tired'.

It is a slovenly habit to use chemical symbols for the sake of brevity or ease of writing, when the substance to which reference is made is neither an element nor a pure chemical.

After weighing it was dissolved in concentrated **HCL**, and again taken to dryness to remove all the silica; again dissolved in concentrated **HCL**, diluted and filtered.

He means **HCl**—not the high cost of living—but the use of the chemical symbol is not to be recommended.

The output consisted of 112 oz. **Au** and 24,515 oz. **Ag**, making a total value of \$24,323.

He used "**Au**" and "**Ag**" as a sort of shorthand, improperly.

Participles are commonly misused by novices. The dangling of a participle at the beginning of a sentence contravenes the rule of grammar that the substantive to which a participle relates must appear in the same clause. For example:

Approaching the vein, the serpentine is seen to be decayed.

"As we approached the vein, we observed that the serpentine was decayed."

Examined carefully no fossils were detected.

"Although I examined the rocks carefully, I could detect

no fossils" or "Although the rocks were examined carefully, no fossils were detected".

Turning westward there is a striking change.

"Turning westward the observer beholds a striking change."

In going seaward the boulders become smaller.

"Toward the sea the boulders are smaller."

Even practised writers are frequently guilty of the error of using participial phrases having no logical relation to the clauses preceding. Thus:

The sandstones are massive, occurring chiefly in the lower half of the formation.

"The sandstones, which are massive, are chiefly in the lower half of the formation."

The output of the mine is about 100 tons daily, its assay-value being \$50.

"The daily output of the mine consists of 100 tons of ore, averaging \$50 per ton."

These dikes were found cutting [cut] the granite.

The cliff rises facing [faces] the river.

Another blunder is the use of the participle as an adversative, or contradicting, term, thus:

The vein has a general width of 1 to 6 inches, widening [but] in places [it widens] to 12 inches.

The results were poor at first, improving [but they improved] later.

The choice of the wrong subject-nominative leads to wordiness:

The drainage of the area is accomplished [drained] by three streams.

The collection of the statistics is done [are collected] by correspondence.

Delete the first three words in each of the two foregoing sentences, and the first two in the next example.

Confirmation of these reports cannot be obtained [confirmed].

As says George M. Wood,* from whom the three preceding examples are borrowed:

"The writers of these sentences, having 'used up their verbs' in their subject-nominatives, could find no suitable predicate-verbs and were compelled to employ instead mere auxiliaries of inappropriate words."

The use of 'due' at the beginning of a sentence in the sense of 'attributable' is a common error, for the reason that a causal phrase, which is adverbial, should not be introduced by an adjective.

Due to [In consequence of] the aggressive attitude of the labor-unions and the scarcity of skilled operatives, it is more difficult than ever before to secure high efficiency.

Such problems are nearer solution, **due to** [as the result of] the researches of Bragg and others.

This is explained by the fact that this substance, **due to** [in consequence of] the predominating effect of the calcium, coagulates the slime.

Due to [In consequence of] the rise in copper, many mines are being re-opened in this district.

Those who fall into this bad habit are also likely to begin their statements thus:

Indicative of the success of the method is the cost, which is now 60 cents per ton.

This can be improved:

"The success of the method is indicated by the low cost, which now is only 60 cents per ton."

The line of strike of each fault is very crooked, **due to the fact that** [because] the faults traverse a rugged country.

The Whittier school was injured by the earthquake, **due to the fact that** [because] the building stood on made ground.

On the other hand, 'owing' may be misused for 'due'.

The injury was **owing** [due] to the earthquake.

'Tend' is a word that may prolong a sentence without adding to the sense. Many writers enfeeble a verb-phrase by inserting the superfluous 'tend'.

* Op. cit., p. 58.

The use of flotation **tends to aid** [aids] the saving of copper in chalcocite ores.

Such methods **tend to cheapen** [lessen the cost of] the operation.

Unemphatic words at the beginning of a sentence usually precede roundabout statements:

Because the surface **tends to contract** with a definite force does not mean that it is coated with anything like a rubber membrane.

Here "tends" is used correctly, but the verb-phrase is left without a subject! It might be better to write:

"The fact that the surface tends to contract with a definite force does not prove that it is coated with anything like a rubber membrane" or "The contraction of the surface does not indicate that it is coated . . ."

Here is another example of a poor beginning and a vague statement:

By such a system I believe we could establish a foreign trade based on honesty of goods which other nations would find it hard to take from us.

"By" is a weak introductive. He means:

"Such a system, I believe, would serve to establish a foreign trade so well based on honesty of goods that other nations would find it hard to compete successfully with us."

'Along these lines' and 'along this line' is a common crudity. It is neither precise nor clear.

Examinations **along these lines** were made every year.

"Examinations of this kind [or for this purpose] were made every year."

The development of the mine **along this line** is sure to prove successful.

"The development of the mine in accordance with this plan is sure to prove successful."

Investigations **along petrographic lines** are not needed.

"Petrographic investigations are not needed."

The company made a proposal [of a novel kind] to its employees **along novel lines**.

'Occur' and 'occurrence' are over-worked, especially by geologists. They are words to be used sparingly.

The other **mineralogical occurrence** [mineral] I found in the Gila Canyon Consolidated Copper Co.'s mine.

He meant "mineral", as the content showed, not an association or grouping of minerals.

There are seldom any signs of secondary copper enrichment, unless it be the occasional **occurrence** along cracks of pyrite.

He means: "Signs of sulphide enrichment are rare, except where the pyrite has been deposited along cracks". "Occasional occurrence" suggests time; he means place; here and there the pyrite was detected by him along the cracks. "Cracks of pyrite" is a bad phrase.

The gold **occurs** [is] distributed over a large area.

The fluorspar mines **occur** [are] in Pope and Hardin Counties.

Too frequently 'occur' takes the place of a word that is more specific.

Hardwood trees **occur** on these slopes.

The word he needed was 'grow'.

In parts of the mine where the fault **occurs**, the veins are shattered and impoverished.

He means that where the veins are crossed by the fault, they are shattered and poor in gold.

The telluride **occurs** in [lines or encrusts] **the interior** of the cavity.

A 'cavity' is a void, considered with reference to the circumjacent material. "The telluride encrusts the walls of the cavity."

Underlying this decomposed garnet in the formerly barren crystalline lime [are] the secondary zinc ores **occur**.

Delete 'occur' and end the sentence with a significant word. Writers who overwork 'occur' are likely to introduce their

statements with 'there is' and 'there are', both of which are poor locutions.

Wherever the galena occurs **there** is an increase of silver in the ore.

The man that wrote this failed to say where or how the galena was distributed in the lode or vein, and thus omitted an essential item of information.

"Wherever the galena is, there the ore is richer in silver."

There are so many factors **entering** [enter] into this problem of sampling.

"There are" can be deleted.

Small packages can be easily carried and **there** is not the incentive to drop them by the carriers.

This can be amended thus:

"As small packages can be carried easily, the carriers are not tempted to drop them."

There are few Cornishmen employed at Treadwell.

I question whether **there** is any probability of succeeding with this process.

These statements may be made more concise, thus:

"Few Cornishmen are employed at Treadwell."

"I question whether the process can be used successfully."

There are more men killed in metal-mining in the United States, in proportion to the number employed, than in the country's coal mines.

Here 'there are' merely detracts from the force of the statement; start with "More men are killed" and note how much more direct and forceful it becomes.

There is another plan for controlling welders which is being considered carefully.

This could be stated better thus:

"Another plan for controlling welders is being considered carefully", thereby avoiding the unnecessary use of a relative clause, and dropping the feeble introduction "there is".

'It is' must be placed in the category of feeble introductions.

It is the belief of the miners that the ground now worked may be a slide.

"The miners believe that the ground . . ."

It is a sign of richness in gold when the quartz is ribboned.

"The ribboning of the quartz indicates that it is rich in gold."

Begin and end a sentence with an emphatic word, as far as may be practicable without stiling the phraseology.

Study the meaning of words so that you will not employ 'evince' or 'evidence' when you mean 'show'; 'phenomenal' when you mean 'extraordinary'; 'transpire' for 'become known'; or 'problematical' for 'doubtful'. As you obtain literary taste, you will abhor 'advent' as a synonym for 'introduction' or 'arrival'; 'situation' for 'state'; 'eliminate' for 'remove' or 'avoid'; 'initiate' for 'begin'; 'proposition' for 'proposal'; 'contemplate' for 'plan' or 'intend'; 'balance' for 'compensate'; and 'unethical' for 'improper'.

The stamp-mill held its own until the **advent** [introduction] of the cyanide process.

The treatment of the pyritic copper ores awaited the **advent** [development] of modern smelting methods.

The **cyanide situation** [scarcity of cyanide] in Northern Ontario during the War crippled mining operations.

Coarse pyrite leaches as readily [as], and yields its copper **more** completely, than **finer** [the fine].

The comma should follow, not precede, "than".

A tramway will be built around Mineral lake to **eliminate** [obviate] the use of barges.

The **proposition** [proposal] made by the union was rejected.

The erection of one smelter and the completion of others **now contemplated** [planned or proposed].

It would be **unethical** [improper] to disclose my reason for withdrawing from the case.

No man with a right feeling for language would be guilty of such lapses. Acquire good taste by reading good literature: Huxley and Ruskin, Emerson and Stevenson. Read 'The

Atlantic Monthly', 'The Interpreter', and 'The World's Work', not the magazines that adopt the language of the street. I venture to say that many young engineers acquire incorrect ways of speech by reading the dialect stories in the cheap magazines. Moreover, your work will bring you into close contact with illiterate men—laborers and artisans—from whom unconsciously you acquire bad habits of language. To correct these you should make a practice of reading the best writings, so as to improve both your taste and your technique. Volume IV of 'Modern Painters' will help a geologist; Huxley's essays are a tonic to any technical writer. If you read only second-rate stuff, you will lose the taste for good English, and the quality of your own writing will suffer, until you may be guilty even of such lapses as the following:

There are companies arranging to install commercial size units of several new inventions. It is far from probable that all these schemes will prove successful and therefore one anticipates hearing of disappointments experienced by the pioneers in this work.

He may have meant to say:

"Several companies are arranging to erect working units based upon new inventions. It is unlikely that all these schemes will prove successful, and one may expect that the pioneers will suffer many disappointments."

In practically every instance, operators plan to make the fuel item a self-contained proposition.

He is speaking of oil-shale, and he means:

"Most of the operators plan to use the shale itself for fuel."

These often contain cassiterite, sometimes in profitable quantities, but long before the water sorted gravels are reached the wolfram has disappeared, though it comes from the same lodes as the tin ore where it almost invariably occurs in considerably greater quantities.

Probably he meant:

"In many localities these alluvial deposits contain sufficient cassiterite to be mined profitably; but the wolfram disappears long before the water-sorted gravel is reached, although it is

derived from the tin-bearing lodes, in which it is more plentiful than the cassiterite."

That may not have been his meaning; the worst consequence of such writing is not ungainliness but obscurity. The writing may not be intended to be beautiful, but it certainly is intended to convey information, and in that it fails.

In a cross-cut on the 14th level in ground to the east of the main drift along the line of the larger ore-shoot a vein of quartz was struck, which on being followed soon developed values, and further on extraordinary values.

Would you think of engaging the services of an engineer showing so little intelligence? He may have meant to say:

"On the 14th level a cross-cut going eastward from the main drift, that is, the one along the line of the larger ore-shoot, struck a vein of quartz, which showed ore, and a little farther yielded ore of extraordinary richness."

Much of the slovenliness to be noted in technical writings is due to the failure of the author to think logically, and therefore to visualize the successive operations in their proper relations, that is, to use an old saying, he puts the cart before the horse. For example, a talented technician writes:

The gases from each furnace pass through two Stirling 700-hp. boilers, making six in present use and six more to be constructed with the new furnaces. In addition, two similar furnaces are fired direct.

The reader will not object to the repetition of "furnaces" if thereby the sense is made clear, but he will be perplexed by the third mention of the word until he surmises that it refers to boilers. This is plainly an example of slovenly writing. I quote from the same writer:

The **length** of campaign with the 19½-ft. furnaces is about 100,000 tons; it is expected that the new furnaces will **handle** 150,000 tons.

Length is not measured in tons; even though Einstein permits us to say "length of time", we can not speak of length of weight. The word "handle" sounds more technical than it is; the use of it with reference to the capacity of a furnace gives a

wrong impression; it shows confusion of thought, which confusion is communicated to the reader.

There has never been any doubt that the problem of dry concentration would some day be solved and its present successful **advent** should not be passed by without at least an investigation.

How does one 'pass by' an 'advent' even in the dark?

"No one has doubted that dry concentration would some day prove successful; therefore this latest experiment is well worthy of attention."

Because of the importance to the United States if workable deposits can be proved.

He means the importance "of proving the existence of workable deposits" of a specified mineral, needed in war.

Use words so that each one may be significant. We keep different tools for different kinds of work, thereby gaining efficiency. Keep each word to its allotted task.

'Differentiate' refers to a physical process of becoming different, and to that which constitutes the difference between things; it is not a correct synonym for 'showing prejudice' or 'distinguishing unfairly'.

It would not be fair to **differentiate** [discriminate] against him.

'Designate' is to specify or particularize, not to choose, appoint, or name.

He **designated** [appointed] Jones foreman.

'Visualize' is to make visible, to imagine vividly, not to see, describe, or illustrate.

He was unable to **visualize** [make us see] the horrors of war.

'Discount' is to deduct from an amount or make allowance, not to expect, anticipate, or offset.

The manager **discounted** [anticipated] the caving of the stope.

These examples should serve as warnings to the engineer who makes a fetish of efficiency and writes articles upon it in ineffective language.

'Apt' means 'suitable' or 'appropriate'; one can make an apt quotation or find something apt for the purpose. It means also 'having a habitual tendency'.

The compilation from the libraries is especially apt [likely] to be based on a great deal of guesswork.

Authors are like miners: they put the precious metal into their books; but when one gets to the mine, there is apt [likely] to be a lot of slag about.

Of course, it is most unlikely that there will be "a lot of slag about" the mine. Slag is made at a smelter.

Sir William Crookes was laughed at, but his sensations [sensational statements] [probably] were apt to prove true.

It might be better to say that his statements "had a way of coming true".

'Liable' is misused in a similar way.

Constant exposure is liable [likely] to be injurious to health.

'Liable' refers to something undesirable in a legal sense, subject or amenable to penalty, under obligation to somebody.

India's influence on the market for gold and silver is not always realized; but, as Samuel Montagu & Co. point out, a country with a population of over three hundred million persons with the hoarding instinct is liable [likely, or has the power] to affect progress to a considerable degree.

On the other hand 'likely' is used for 'probably', as in

Mr. Ford is likely confusing the purchasing or hiring of ability with the non-purchasable virtue of honesty.

This, of course, is lamentable. One does not hire ability or purchase virtue, one hires able men and likewise honest ones. This use of the abstract in place of the concrete is worse than slovenly; it will be discussed later under 'Jargon'. The writer meant to say:

"Probably Mr. Ford is confusing an ability to hire clever men with an inability to corrupt honest ones."

'Practical' and its derivatives are much mishandled by technical writers; indeed the word 'practical' is given a wrong significance so often as to have lost much of its proper meaning. A 'practical' man is mentioned in antithesis to an 'academic'

or 'scientific' man, thereby suggesting the connotation of ignorance. 'Practical' means 'concerned with practice'. Many of the so-called practical men, in mining for example, are no more closely concerned with the practice of mining than are the technical men with whom they are contrasted. A man is practical when he is capable of applying knowledge or theory to practice, not when he disregards the knowledge and scorns the theory. Many are the men who are termed 'practical' on account of their ignorance. Some are termed 'practical' because they lack scruple or have a direct way of doing things to gain their own ends. Theodore Roosevelt said: "I have never supposed that to be practical was to be base".

Due consideration has also been given to the **practical** [practicable] and **impractical** [impracticable] in making alterations.

The method is neither **practical** [practicable] nor possible.

A number of tests led to the conclusion that the method was **not practical** [impracticable].

It is **practically impossible** [impracticable] to prevent a few tons of pyrite from escaping into the gob [fill].

It is **not practical** [impracticable] to increase the output of crude oil for more than a few months.

Practically speaking, the use of the filter was not likely to improve the treatment of the slime.

Here "practically" is meaningless, because obviously the subject could be discussed only from a practical standpoint.

Dodge Brothers state in an advertisement:

The first cost is **practically** the last.

"Practically" here means 'to all intents and purposes'; it is equivalent to 'virtually', or 'almost'. As the owner of a Dodge automobile—and it is a good one—I can testify that 'practically' is entirely misused in this advertisement, because the "last" cost is by no means the "first".

'Materially' is used with similar irrelevance.

This did not **materially** improve conditions in the mill.

As the subject of milling involves the treatment of material and the use of various materials, it is infelicitous to use 'ma-

terially' in this context. He uses it in place of 'particularly' or 'notably'. The primary meaning of 'materially' is 'concerned with the material, not the form, of reasoning'; the secondary meaning is 'of or relating to matter'.

The screen showed **materially** [decidedly] less tendency to clog.

The writer whom I quote used this word in an article in which he stated also: "into the material on the screen and then away from the material". Likewise, "the action rolled the material over the individual wires". Manifestly it was a blunder to use 'materially', and to use it in a wrong sense, in such a context.

'Directly' is used improperly in place of 'as soon as'.

The house comes in view **directly** [as soon as] the drive is entered.

I weighed the button **directly** [as soon as] it was cool.

Immediately [As soon as] this is recognized as a fact it will be impossible to advise any such action.

An American provincialism that is gaining ground is the use of a geographic noun as an adjective, thus:

A **California** [Californian] mining engineer

The **Alaska** [Alaskan] method of drift mining

Our daily papers show such head-lines as "Good Italy Harvest"; "Great Albania Battle"; "U. S. Victory". In these the corresponding adjective is desirable: Italian, Albanian, American. Undoubtedly such newspaper usage is corrupting. I have referred to it previously. Technical writers should take care not to copy the habits of the illiterate.

Long and inane phrases are used to introduce inconsequent statements, as in

Excepting a small number of cases [usually] the gravel of the Siberian placers contains more boulders than gravel.

Temperature problems have to be **taken into consideration** [considered] in some of the deep mines.

There is no question but that [unquestionably] the ore can be concentrated satisfactorily by means of [by] flotation.

The use of 'spells' in such phrases as 'spells disaster' is common in contexts for which it is unfitted.

In these days when the industrial slogan **spells** [is] increased production.

The fall in the grade of the ore in the lower workings **spells** [foretells] the end of the mine.

The use of the gerund or participle as an adjective is slovenly.

• Such a **setting preventive** must be destroyed subsequently during the **burning process**.

He is speaking of making cement, and means:

"Such a check to setting must be destroyed subsequently during the process of burning."

An **examining engineer** should be careful to distribute his **sampling cuts** at intervals suited to the character of the ore.

That is, if the ore is spotty the cuts must be made at shorter intervals than in ore that is fairly uniform in its metal content. He ought to have written:

"An engineer, when sampling a mine, should be careful to distribute his cuts at intervals . . ."

The "examining" before engineer is redundant, because "sampling" involves the idea of investigation; if the idea of examining must be introduced, one can write:

"An engineer, when examining a mine . . ."

The **resulting** solution goes to the **precipitating** vats.

"The solution thus formed goes to the precipitation vats."

The vats are 'for precipitating'; a hyphen might suffice to indicate this relation, but 'precipitation' is preferable. One might say "the solution that results", but the reference is to the chemical making of it.

The awkward use of participle and gerund is illustrated in the following:

With a view to **relieving** the situation brought about by an attempted **cornering** of the market in 1896, a new company was organized.

"To relieve the consequences of an attempt to corner the market in 1896, a new company was organized."

“Relieve” might be replaced by ‘overcome’, ‘correct’, or ‘avoid’. The choice of verb depends upon the facts.

The result to the company is a greater stabilization of the operating conditions.

This is from a New York mining journal. If a condition is stabilized, that suffices. The statement is too vague to be edited.

The hope was for a realization of [to realize] industrial peace.

The manager was opposed to unionism [unions] and collectivism [collective bargaining].

It was in accord with his characteristics [character] that he should do this thing.

His individualistic tendencies [egoism] rendered it impossible for him to work harmoniously with other members of the staff.

As Allbutt says, it is well to look askance at words ending in ‘ism, ‘istic, and ‘ization, for “they come of a vacuous tribe”.

‘So far as’ is used with clauses that suggest doubt or variation; ‘as far as’ with clauses that state a fact.

The capacities quoted may be considered subnormal as [so] far as rock of average hardness is concerned.

He went so [as] far as Nome.

As [So] far as I know, the ore deposit is unique.

Here are a few more examples of careless phrasing.

The dip of the orebodies is steep, that is, [so] steep enough that the surface above is not likely to be disturbed by taking the ore out below [the removal of the ore beneath].

Either [Any one] of his five fingers

A higher [An increased] consumption of power

The first consideration is the comparative lowness in grade [poverty] of the ore.

To what an abyss of incoherence it is possible for the slovenly writer to fall is illustrated by the following two paragraphs from an article on the sampling of ore.

Sampling mills offer inducement for special equipment to maintain through crushing, in that the duty of the units is comparatively light;

the size reductions may be similar to those in other mills but the amount of material crushed seldom approaches the capacity of the units so that unusual configuration for working surfaces might last long enough for practical use.

If the unitings and pourings be repeated 10 times with 50 passings on the 30 riffles the pulp has been cut 15,000 times; the material has been scattered out into 1000 superimposed layers; and 10 times has any local inequality not been merely spread between the halves and along the 15 slot layer but half of it has grossly projected into an entirely different portion of the pulp.

I shall not try to revise these incoherent utterances. Here is one from a paper issued by the U. S. Bureau of Mines.

The condition of the underground metal mine working face often is similar to that which would be produced should all the windows of a sleeping room be closed tightly and air derived wholly from open door to the hall, the resultant headache to sleepers from such situation being augmented to the miner by dust, gases from explosives and decaying timber, and possibly by high temperature and humidity and alleviated to a slight extent by release of compressed air.

I venture to revise as follows:

"Often the atmosphere underground at the working-face of a metal mine is similar to that of a sleeping-room in which all the windows are closed tightly, and in which ventilation is possible only through the open door to the hall. The sleeper suffers from headache; the miner's discomfort is increased by the presence of dust, the gases from explosives and decaying timber, and, possibly, by the warmth and humidity of the mine-air. These conditions would be alleviated only slightly by the release of compressed air."

Technology knows no political boundaries. The part of it written in English goes around the world. We exchange freely with the British and their cousins overseas. The English language is the common heritage alike of the American and the Briton, both of whom befoul it with vulgarisms and colloquialisms that are understood only locally or regionally. In order that technical literature may pass current wherever our language is spoken, and even in foreign countries, where it has to

be translated laboriously, it is our duty to discard local terms or provincial phraseology. For example, 'reef' as used for 'lode' in Australia and 'ledge' as used for 'vein' in California are both objectionable terms. An orebody underground has no resemblance to the rock that imperils navigation, nor does a vertical outcrop resemble a shelf. On the other hand, a 'ledge' of oil-shale is correct, because the shale is nearly horizontal and projects from the face of a hill like a shelf.

The Australian puts his 'mullock' [waste rock] in a 'paddock' [enclosure] whereas the American puts his 'dirt' [ore] in a steel 'tank' [bin]. The 'mullocker' at Bendigo is equivalent to the 'mucker' at Tonopah, and each is a 'shoveler' in good English. I need not multiply examples of bucolic terms and illiterate localisms. They disfigure technology and obstruct scientific thought. Why should a scientific man—for that assuredly describes the mining engineer—go to the illiterate workman for his terms? If you wish to learn how to break rock ask the Cornish or the Italian miner, by all means; but if you wish to use the delicate instrument of expression accurately ask those who are trained in the art. Graduates of a university are expected to obtain their terminology from the library, not from the stope; they should mould their phraseology on the conversation of the college, not on the talk of a bunk-house.

These tanks [steel bins] have proved satisfactory, especially to the millmen, who are relieved of all ore-bin mucking.

He means that they are relieved of the labor of shoveling inside the ore-bin.

An interesting development of local usage that ignores the accepted meanings of technical terms is to be noted in the Joplin district of Missouri and the adjoining zinc-mining districts of Kansas and Oklahoma. There a concentrate is called 'ore'. The local scribes speak of 'blende ore' and 'calamine ore', meaning mill-products containing a large proportion of the sulphide and the silicate of zinc, respectively. Moreover,

they talk of a 'lead ore' and a 'galena ore' interchangeably, although they differentiate between a 'zinc ore' and a 'calamine ore'. Again, the "ore" may be the crude, but selected, product direct from the mine or it may be a concentrated product from the mill. They have numerous other local terms, of less consequence because they do not conflict with usage elsewhere. Joplin, however, is not peculiar in having adopted a half-baked terminology. In Gilpin county, Colorado, it is the custom to speak of the pyritic concentrate, containing gold and silver, and sometimes copper, as 'tailings'. The plural is habitually used, whether one or more products are being discussed. There used to be a regular trade in 'tailings', this mill-product being bought in small lots by ore-brokers for the purpose of preparing a pyritic mixture upon which advantageous terms of treatment could be obtained from the smelters at Denver. They said "tailings" when they meant not the discard from the stamp-milling and bumping-table operations but the valuable sulphidic concentrate. Such usage beggars language. In Boulder county, Colorado, the miners speak of the dark agatized quartz as 'hornblende', meaning 'hornstone'. Shall we accept that also? In the Lake Superior copper region it is customary to speak and write of the ore as 'rock' and to refer to the crushing-plant as the 'rock-house'. Along the Mother Lode in California it is usual to call the ore 'gold quartz' although it contains only a minor proportion of quartz, the major constituent being slate. The product of the mine contains much slate, some quartz, and a minute proportion of gold, so that 'gold quartz' is a misfit. Moreover this term ignores the economic factor, that is, it fails to indicate whether the proportion of gold to the quartz and slate is sufficient to make the rock an 'ore'. Such localisms and vulgarisms are not only unscientific, they are unintelligible outside their own habitat. What could an intelligent reader at London or Melbourne, at Shanghai or Vancouver, even at Chicago or New York, make of them? They would bewilder him. A plague on such localisms! They are not even discriminating

in their own way, largely because they reproduce the untechnical talk of the stope and the mill. It is well for us to go to the miner and the mill-man for knowledge concerning the mining and milling of ore, because that is *their* special business, but why in the name of Roget and March, of Webster and Murray, should technical writers, who are supposed to be specialists in *their* business, which, among other things, is to write intelligibly, go to the artisan and to the mechanic for the terms they use in describing the operations that they direct?

Such adoption of local vulgarisms by careless writers may be defended by shallow critics as one phase of that absorption of new elements by which a language grows. The English language is a living organism fed continually out of the varied human experience of our peoples—the American and British predominantly, but also the others who speak it across the seven seas. All of which in no wise excuses a literate engineer for discarding recognized technical terms in favor of half-baked provincialisms.

To write well you need self-restraint—a grip on yourself. The notion prevails in some quarters that it is effeminate to use words with nicety, that the practical man is expected to fling them about with careless vigor. That is a mistake. An educated man is disciplined in the use of words as in conduct. Indeed, the self-discipline of writing is a splendid training for any engineer. It teaches him how little he knows accurately, and spurs him to gain a thorough understanding of his subject. The turbid pulp in a mill is made clear by passing through classifiers and settlers, in which the mineral particles are separated and concentrated. Similarly ideas, odds and ends of information, stray bits of observation, if passed through the mind in the act of writing are co-ordinated, classified, and systematized into workable shape, into definite form, available for the storehouse of knowledge.

In technology we should try to keep each term for a specific duty.

‘Locate’ and ‘location’ should be restricted to the delimit-

ing of a claim. If we use these words in other senses, we cause confusion.

He **located** the mill on Deer creek.

Did he 'locate' a mill-site or did he build a mill on the creek?

The superintendent **located** [found] the ore-shoot on the fifth level.
He is now **located** at Silverton.

"He lives at Silverton now."

The mine is **located** in Northern Rhodesia.

Delete 'located', or substitute 'situated'.

A judge, in deciding a case, says:

In that event the plaintiff would not be following its own vein, but following an entirely different vein, though at some prehistoric time this second vein **was located** [existed] some place else [elsewhere] or had not been found.

In a previous sentence the Court had used 'locate' in its properly technical sense, thus:

When Ely Hilty **located** the Tom Reed vein on January 1, 1904.

Later the Court used 'located' wrongly:

The plaintiff did not identify the ore which it **located** [found] beneath the surface of the Big Jim claim as the continuation of its vein, known as the Tom Reed vein.

Another slovenly writer said:

To **determine** the location of the structural phenomena that had been noted where ore-shoots occur.

This is jargon; one can only guess what he means; probably:
"To observe the structural relations of ore-shoots."

The same scribbler wrote:

The shaft had been **located** [started] near the outcrop.

I was employed to **locate** [find] the ore-shoot.

I was unable to **locate** [sink] the shaft in ore.

'Carboniferous' and 'carbonaceous' have different meanings. They should not be used interchangeably. 'Carboniferous'

referred originally to the geologic division of time associated with the formation of coal, but all Carboniferous strata do not contain coal. It is now simply the name of a geologic period, and is given a capital 'C'. 'Carbonaceous' means carbon-bearing, or containing carbon; it may be used to describe a black shale. A rock may be both Carboniferous and carbonaceous, as in Missouri, where a limestone belonging to the period immediately succeeding the Devonian is black with the product of decomposed vegetal (not 'vegetable') remains.

The words 'calcining' and 'roasting' are not synonyms. The first should be applied to a process for removing carbon dioxide from carbonates, such as limestone, or for dehydrating a hematite ore; the second should be restricted to a process for the expulsion of sulphur by heat in the presence of oxygen.

'Tank' is a term sadly over-worked. It means a large vessel used for storing fluids; if used for conducting a chemical process it may better be called a 'vat'. This distinction is not observed often, but it can be made to advantage in technical writing. Recently the word 'tank' has been used for a cylindrical ore-bin made of steel. This use only serves to confuse. An engine of war lately devised has been called a 'tank', although it is more like a glyptodon or some other monster of the primeval slime. We can forgive the 'boys' in the trenches anything, but not the metallurgist that calls an ore-bin a 'tank', as if in mockery of these dry days.*

The transactions of technical societies exhibit such blunders as the use of 'slacked' and 'slack' in connection with lime. 'Slacked' has no meaning in such a context; 'slaked', the correct spelling, is full of meaning. When one pours water on lime it reminds one of the Sudan thirst as described by G. W. Stevens in 'With Kitchener to Khartoum'; the lime sizzles and gurgitates as if in ecstasy of absorption. The 'slaking' of lime is a pictorial phrase; the 'slacking' of it describes nothing. Others, equally careless, speak of a concentrating-table for

* These references to the War and to Prohibition were more timely in the first than in the second edition of this book.

treating slime in a mill as a 'slimer', which means a maker of slime. The termination '-er' signifies agency. The proper term is 'slime-table'. Sometimes it is a 'de-slimer' table, if the purpose be to discard the valueless gangue, which has been crushed to a slime, in order to concentrate the valuable mineral, which likewise has been pulverized. On the other hand, in technology we use 'dewatering' for the removal of excess water in a pulp, but 'unwatering' for the draining or pumping of water in a shaft or other mine-working. The 'mat' of froth in a flotation machine and the 'mat' of timber used in the caving system of mining are sometimes mis-spelled 'matte', which is a term peculiar to smelting and means a mixture of metallic sulphides. 'Classify' and 'size' are used almost interchangeably. In milling, to 'classify' is to group particles of equal mass; to 'size' is to group particles of equal dimensions. Another example of indiscriminating usage may be instanced. 'Chute' and 'raise' are employed as synonyms. The passage or chimney made through rock underground is a 'raise'; the slide or inclined trough at the outlet, for the delivery of broken ore, is the 'chute'. All raises are not provided with chutes, nor need a chute lead from a raise. The distinction becomes important when describing the shrinkage and caving systems of mining. Again, 'chute', the sloping channel down which material is passed, must not be confused with 'shoot', which is an orebody of recognizable shape and inclination within a vein or lode. The failure to distinguish between 'recovery' and 'extraction' is the cause of misinformation. A metal is 'extracted' when it is in marketable form; it is 'recovered' when it has been collected or concentrated in a form assuring successful extraction. Thus a flotation mill 'recovers' copper in a concentrate that is sent to the smelter, where the copper is 'extracted'. The Spaniard and the Mexican distinguish between *recoger* and *extraer*. One reads descriptions of mills and other metallurgical plants in which one is told that some metal has been "extracted" at a given cost; this would indicate a handsome margin of profit if indeed the metal had been

'extracted'; but the series of necessary operations has not been completed, and considerably more cost must be incurred before the metal that has been 'recovered' in an intermediate product is finally 'extracted' and ready for sale. By using technical terms thoughtfully we increase our vocabulary; the careless use of words means the loss of distinct meanings, whereas the discriminating use of them assists precise expression.

'Section' is often used improperly. A section is a division of the public land containing 640 acres. It is also the view along an imaginary slice of anything, such as a geologic section or the section of a machine intended to exhibit the interior. We ought not to use it as a synonym for 'region', 'district', or 'locality', as in:

The South-West is an arid **section** [region].

In this **section** [district] the mines produce gold only.

Sulphides are found in **sections** [certain parts] of the mine.

An engineer should keep technical words for appropriate uses, otherwise they lose their special significance. A 'tunnel' is a gallery or bore that goes through a hill or mountain from daylight to daylight, as a railway tunnel does. A drift or cross-cut that enters a mountain from the surface, to become the main artery of a mine or to drain the water from the underground workings, without going through to the other side of the mountain, is an 'adit'—a term used by miners from time immemorial.

It is well to note that mistakes are rarely solitary; like sorrows "they come not single spies, but in battalions". Let me impress upon you the fact that if you are careless about one detail—apparently unimportant—you are likely to take no thought about others. Whether or not you accept my dictum concerning the use of this or that word or the rejection of this or that method of statement is of minor importance as compared with your acceptance of my general argument: that it is worth while to use words precisely and to build sentences logically. The man who learns to master the little words will acquire mastery over the big phrases. Genius has been called an infinite capacity for taking pains. The definition is incom-

plete, but it recognizes the first requisite of all good workmanship: the effort to be thorough. Permit me to conclude by quoting from an entry in Amiel's journal:

"March 27, 1854:—If to write is, as Buffon says, at once to think properly, to feel properly, and to interpret properly, then to write badly is at once to think badly, to feel badly, and to interpret badly. It is the effect and the punishment of a disorder of the spirit, of feeling, or of will. Its cause is a certain lack of scruple and a failure in insight. The writer is the man who follows his thought, his sentiment, and his will to the very end, and criticizes himself to the very last detail. He is the severe and complete thinker. In fact, expression is an essential part of truth, and the art of expression is the practical part of the art of thinking. Respect for truth imposes perfect exactness in language. A good choice of words, like exactness in reasoning, is the probity of the intelligence, and a lack of conscience in words is simply a lack of conscience. What would you say to a business man whose accounts were confused to the point of error, and his scales unreliable? A poor scribbler is nothing else than that."

XII. JARGON

The dictionary defines 'jargon' as "barbarous or debased language". This description does not suffice. Quiller-Couch has said, it is "a kind of writing which, from a superficial likeness, commonly passes for prose in these days, and by the folk is commonly written for prose, yet actually is not prose at all". The two main vices of jargon, he says, are "that it is circumlocution rather than short straight speech", like Babu who reported his mother's death by saying: "Regret to inform you, the hand that rocked the cradle has kicked the bucket". Its other chief vice is that "it habitually chooses vague woolly abstract nouns rather than concrete ones", the newspaper statement, "He was conveyed to his place of residence in an intoxicated condition", instead of saying "He was carried home drunk". Jargon is "an infirmity of speech", it is not journalese, but akin to it. "Like respectability in Chicago, jargon stalks unchecked in our midst" and renders much technical writing ridiculous. It deals in periphrasis instead of going straight to the point, it loves the abstract rather than the concrete, it dabbles in words of sound rather than of meaning. Avoid it, despise it, if you purpose earnestly to write well. "In literature as in life he makes himself felt who not only calls a spade a spade but has the pluck to double spades and re-double." *

Jargon is rampant in technical publications. Catalogues and other advertisements are conspicuous offenders, but with these the critic is not concerned, except in so far as such 'writing

* These quotations are from a lecture delivered at Cambridge by Arthur Quiller-Couch. 'The Art of Writing', 1916.

ups' pretend to follow the style set by technical journals and the transactions of technical societies. Here is an example, taken from a reputable paper:

The next proposition was to take out the rock to a depth of 20 ft. and build up an underpinning wall to carry the weight of the caisson and make the permanent seal to keep out all water. To avoid the possibility of jarring loose any of the temporary sealing blocks or breaking back under them the rock which was of a slaty nature, this excavation was started by channeling out for a depth of 5 ft. all around the shaft about 1 ft. inside of the blocking. The rock was then taken out in the ordinary manner with two shaft-bars and four rock-drills in operation. To further prevent the jarring of this blocking the rock was taken out in 5-ft. benches only. This made the work necessarily slower, but it was deemed advisable and so proved, for, notwithstanding the care exercised, certain leakages occurred which made the rock excavation slow on account of the shifting of pumps, taking off and putting back suction pipes, etc. This rock, as above mentioned, was a species of sand slate which would break back a considerable distance from the line of holes.

I shall not attempt to revise it, for it needs to be re-written by one possessing the detailed information that the writer has attempted, unsuccessfully, to impart. To many it may not seem utterly bad, but it is obvious that only absolute need of the information would induce anyone to read it.

The foregoing example shows how the English language is mishandled in America; now I shall give you an example to show how our language is maltreated in the country of its origin. The following quotation is taken from a book on petroleum recently published in London.

In this vaporizer, which works efficiently with any of the refined flash-proof lamp oils, the mixture is only heated to the comparatively low temperature of 300° to 400° F., in which connection it is well to understand that the more perfectly an oil is atomized the lower is the temperature necessary to its combustion, which is an advantage, if not off-set by the necessity for a more than corresponding complexity of apparatus, which in this case, as will be seen, requires an air pump and for the fuel to be contained in a tank subject to a pressure of 8 to 15 lbs. per square inch; and this again obviously necessitates a separate hand pump, or a pressure supply for starting.

The errors are so many that the entire paragraph needs to be re-written. Why does he hyphenate "flash-proof" and not "lamp oils" and "air pump" or "hand pump". He uses 'which' with irritating frequency; he employs the abstraction "complexity of apparatus" instead of the concrete 'complex apparatus', besides a plain error of grammar, namely, "requires . . . for the fuel to be contained". The writer is an educated engineer, but he disregards the obligations of an educated man.

Here follows an attempt to describe the operation of a machine-drill in a mine:

Following the shooting, the **mucker** begins his work, the drill man climbs to the top of the **muck**, and by the time the four feet of ground shot down is **mucked out**, he is again ready to shoot his round of holes.

"Muck", "muck", "muck"—it is the very muck of writing. The word means filth or manure. It is used as a synonym for 'dirt', the miner's term for broken rock. Thus 'muck' refers to the shattered rock resulting from blasting, which is not in the least filthy. Shovelers, that is, those who shovel the broken rock into the car at the face of a level or cross-cut, are now called 'muckers'. What gain is there? 'Shoveler' is significant; 'mucker' is the rubbish of words.

The next example comes from a description of the small locomotives used in mines. It reads:

Face gathering, wherein the locomotive must enter the room, impose conditions which call for distinctly special treatment in the design and equipment of a locomotive of high efficiency. The ordinary haulage locomotive in nearly all cases is totally unfitted to this work, which involves operation in narrow quarters, around sharp curves, over poorly laid tracks, etc. The locomotive of real value in room work is one which, by reason of proportions and construction, will go wherever a mine car will run, and with equal facility. It must be compact, no wider than the wheels, with short wheel-base and small wheels, and without long overhang at either end.

This is the sort of thing that makes a technical description seem like a cryptogram or a slab of picture-writing from Nineveh. To any one versed in the subject of locomotives for

underground use, this paragraph is intelligible, but only barely intelligible. It succeeds in making the subject as uninteresting as possible and places the meaning as much beneath the surface as the locomotive itself.

The last two examples come from 'write-ups', the trade name for a eulogistic description of a manufactured article, prepared in the interest of the manufacturer and written by a man more accustomed to the use of a screw-driver than a pen. The worst writing concerning technical matters is to be found in such disguised advertisements. They ought to be written attractively, to serve their purpose; in failing to do so, they illustrate the essential ineffectiveness of bad writing.

Grammatical correctness is no excuse for a statement that is likely to cause trouble to your reader; he must have your consideration if you expect to win, and hold, his attention.

A technical journal states:

The specifying by a mining company that no man may be employed by it unless he be a member of such an organization, though undoubtedly legal, is as contrary to social justice as the specifying that no member of any organization will be employed, or the refusing to recognize any employee as representing anyone or anything except himself as an individual.

That reminds one of a passage in 'Alice in Wonderland': "Never imagine yourself not to be otherwise than what it might appear to others that what you were or might have been was not otherwise than what you had been would have appeared to them to be otherwise".

Here is more technical writing of a supposedly serious sort:

The expenditure involved is only justifiable with the assured certainty of very large ore reserves having values materially above operating costs.

I suggest:

"The expenditure involved would be justified only by the certainty of an adequate reserve of profitable ore."

A respectable engineer writes:

They would go to the lay-out and see if it was checked out; if found out to be laid out, the lay-out foreman would spend his time in looking for it, and if he could not find it he would get out a new one.

Such stuff is a disgrace to the profession; moreover, it is proof of such lack of mental capacity as to argue against the possession of technical understanding.

Shun outworn figures of speech, like 'a bolt from the blue', 'the swing of the pendulum', 'the cry is still they come', 'after us the deluge', 'the Mecca of their pilgrimage', 'the Phoenix from his ashes', 'open Sesame', and 'the labors of Hercules'. They rarely give point to technical description; usually they are mere tags, in the reporter's style—a style to be scrupulously avoided in technical writing. Abstain from the use of such verbal inanities as 'festive', 'pristine', 'erstwhile', 'materialize', and 'eventuate'. These are precious to the reporter, but taboo to the intelligent writer.

Take note of the fact that nonsense remains nonsense however much you may disguise it in a veil of words. We think in words, and when we lack clear words we lack clear thoughts. Clear thinking is necessary to effective speech or writing. The forceful utterances and keen analyses to be remarked occasionally in men devoid of academic training show that the question of clear statement depends upon logic. Correct speech—grammatical speech—is logical speech. The following is a quotation from an address delivered by a prominent financier in San Francisco:

Let us learn, then, to realize that each has his dominion and his empire of domination, in which by the exercise of these qualities that are alike in spelling success each may rise to a position of leadership, with potentialities of power as great in its sphere of action as that one of the many, to whom we look for the time being, because of some particular preferment as a leader.

This is balderdash. It is "the delirious trimmings" of language.

Early Victorian elegance has no place in technical writing; for example:

The ore was relieved of its moisture through the medium of drying kilns.

Meaning that "The ore was dried in kilns".
Nor do we want late Nevadan uncouthness:

With the **installation** of the new air-compressor underground development is being **prosecuted** more rapidly.

Is the air-compressor underground or is it being used for development underground? Should a comma come before or after the word "underground"? The rapid progress is not being made "with the installation" of anything, but by the new compressor, actuating more machine-drills. You do not "prosecute" a development; for that involves the pursuit of an abstraction. He means:

"By aid of the new compressor, the development of the mine is being hastened."

The tributer is assisted in the **prosecution** of his work by being given supplies.

'Prosecution', in this context also, is a foolish word, apart from being an abstract noun. Slovenly writers who use such words also use too many others. He meant to say:

"The tributer is assisted in his work by being given supplies"; meaning candles, dynamite, caps, and fuse.

Gold Mountain was turned down by a **succession** of eminent engineers.

It would be more to the point to give the names of some of the engineers.

The slime in the drifts entirely obscured the **occurrence** of the ore.

Delete the words indicated.

He extracted the gold in the residue, thus **doing away with** [obviating] the **necessity** for re-handling [of] it.

It is not the "necessity", but the "re-handling", that he wished to avoid. Was it the gold or the residue that he was trying not to "re-handle"? He meant to say:

"He extracted the gold in the residue, thus avoiding re-treatment."

If the final judgment is favorable, the next step is to assemble the **proposition**.

One cannot "assemble" one thing, any more than one can flock by oneself in a corner. By "proposition" he means the elements essential to the business. 'Proposition' is beloved of jargoneers, who use it for 'proposal', 'business', and for other meanings even more remote, as in:

I would like to know how the **proposition** tends.

He is referring to the National Research Council, and would like to know what it is doing.

Slovenliness in writing is due not to poverty of ideas but to careless thinking. It may escape censure because the majority of readers are uncritical and too patient. Given a careless writer and an equally careless reader, you have a performance as profitable as a harangue to the deaf.

The Lake Superior copper mines are making a good recovery from the disorganized condition in which the long persistence of the strike put them.

Here you have the abstract phrases "the long persistence" and "making a good recovery" instead of a concrete statement saying that the strike had lasted long and that work at the mines had been resumed. "Mines" is not the real subject of this statement, but the work being done in them. He—and he was an editor—meant to say:

"The working force at the Lake Superior copper mines is being re-organized after the long strike, and operations are being resumed."

Statements that seem intelligible and are accepted by the patient reader without protest may yet fail to convey information accurately; and the docile reader—for every man that submits willingly to the attraction of an article, and reads it, is in a docile mood—either loses interest presently because of the vagueness of the discourse, or struggles against the obstacles of clouded style until he is inclined to attribute the difficulty to a temporary inability of his own. The headache that over-

comes the young student in his struggle to conquer knowledge in textbooks is due usually to the defective literary technique of the authors rather than to his own stupidity or to the difficulty of the subject.

The vein is a quartz fissure with a width of 1 to 6 ft., a dip of 50° to the north, and a filling of galena, sphalerite, pyrite, and chalcopyrite.

How can it be a fissure filled with quartz—for that is a “quartz fissure”, not a fissure in quartz—if it be filled with the four other minerals specified? Nor is the fissure attached to a width or a dip. He meant:

“The vein varies in width from one to six feet; it dips 50° north, and consists of quartz containing galena, sphalerite, pyrite, and chalcopyrite.”

‘Encounter’ is a word greatly overworked. It means to meet hostilely or in conflict. The use of it in varying senses tends to vagueness.

The rocks indicate to the miner when **encountered** the general lower limits of the volcanics.

He means that where (not “when”) a particular rock is found underground, there the lower limit (not “limits”) of the volcanic series is indicated. Therefore he might have said:

“These rocks, wherever found in the mine, indicate that the lower limit of the volcanic series has been reached.”

The ore-bearing volcanics are seemingly of **more importance** to the district from a gold-producing standpoint than was at first supposed.

He meant that the volcanic rocks had a greater influence upon the deposition of gold in the district than had been supposed. He used “seemingly” three times in eight lines of his manuscript, and you can infer from that how careless he was.

Some difficulties are **encountered** by the formation of sodium sulphate in the roasting furnace, **which** dissolves **together** with the sodium chromate.

Here “encounter” means ‘caused’. The wrong use of “which” makes the writer state that the furnace dissolved.

The omission of the hyphen suggests that the furnace was "roasting". "Together" is redundant. What he meant to say was:

"During the process of roasting, sundry difficulties are introduced by the formation of sodium sulphate, because it dissolves with the sodium chromate."

All these pluralities, generalities, and abstractions are the mark of jargon. As Quiller-Couch says: "To write jargon is to be perpetually shuffling around in the fog and cotton-wool of abstract terms: to be forever hearkening, like Ibsen's Peer Gynt, to the voice of the Borg exhorting you to circumvent the difficulty, to beat the air because it is easier than to flesh your sword in the thing".

Avoid extravagance. One of the chief obstacles to precision in writing is prolixity, the employment of superfluous words. Shy at such phrases as 'with regard to', 'in respect of', 'at the same time', 'as a consequence of', 'in connection with', 'from the standpoint of', 'on the basis of', 'of such a character', 'to any extent', 'according as to whether', 'on the whole', 'more or less', and so forth. Occasionally one or another of these unlovely locutions may be useful or necessary, but resort to them grudgingly, treating them as first cousins to jargon, which is the newspaper prostitution of our language.

With regard to the process, the principal difficulty that arose in connection with the operation of it was the large amount of dust; the success of it therefore depended as to whether it could, or could not be collected without incurring a more or less prohibitive expense.

The 21 words indicated are mere 'empties' in the train of thought. Note too the careless use of "it"; the first and second refer to "process", but the third refers to "dust". He might have said:

"The success of the process depended upon the economical collection of the dust made during the operation."

For it is well known that man's methods are ever changing while Nature's laws upon which they depend are invariable.

Two unnecessary and insipid clauses are interjected under the false impression that they give dignity to the statement. How much stronger it sounds thus:

“Man’s methods are ever changing; Nature’s laws are immutable.”

Perhaps a few notes as to some of my experience in connection with mining in Colombia will be of interest.

“Perhaps a few notes on my mining experience in Colombia will be interesting.”

Mistakes in assaying are far commoner than is generally thought to be the case.

“Mistakes in assaying are more common than is generally supposed.”

The silver veins have not been enriched [sufficiently] to a commercial degree except near the dikes.

He means that the vein-filling is not rich enough to be ‘ore’. The use of the adjective ‘commercial’, as in “The mine is now able to produce commercial ore”, is an objectionable vulgarism. The ore was not the subject of commerce, but of metallurgical treatment by the owners of the mine.

‘In this case’ and ‘in the case’, with their variants, are used by careless writers to an excessive degree. They are vapid phrases at best and readily contribute to the making of jargon. Here are a few more examples:

The same as is the case where the soap solution is added.

This refers to the use of soap in the flotation process. “Where” is entirely inappropriate to the meaning, which is:

“The same as when the soap solution has been added.”

The main reason why the contract system fails, as it has in many cases, is because [that] it is applied unfairly to the workers.

The statement refers to the contract system as used in mines; if the writer had used ‘mines’ instead of “cases”, he would have said something. “Case” is a vacuous word; it reminds

me of the head-line in a San Francisco evening paper, when the King of Portugal was assassinated: "Youth ascends throne vacated by bullet", meaning that the throne had been made vacant by the bullet that killed its occupant.

The distribution is more perfect with this machine than is **the case** with the other type, **where** [in which] gravity interferes with the movement of the crushed rock.

The entire statement is jargonese. He means: "The distribution of the crushed rock is more uniform in this machine than in the other, in which gravity interferes with the movement".

This is an advantageous feature **in the case where** thickened sludge is being drawn.

"In the case where" should be replaced by the single word 'when'.

This device is especially suitable **in the case where** a slimed pulp is being handled.

This is like the previous example. He means:

"This device is particularly adapted to the treatment of slime."

The principle on which the vertical disc-crusher operates is the same as **is the case with** [that of] the horizontal machine.

A higher consumption of power sometimes occurs **in those cases where** the rock crushed contains a proportion of material that cakes and tends to choke the machine.

"The consumption of power may be increased if the rock to be crushed contains an ingredient that cakes so as to clog the machine."

The use of 'where' with 'cases' and 'instances' is a common blunder.

The other extreme is met with **in those cases where** a lot of mater is **very** heterogeneous.

Those who write jargon are rarely content with one sentence; the above example contains several.

"met with"—a meaningless phrase—and the addition of "very" to "heterogeneous" will be noted. He is writing on the subject of sampling ore, and he means:

"The other extreme is presented by ore of heterogeneous composition."

Then in the case where a single metal is saved in a single concentrate

He means that the concentrate is not one that contains several metals on which the smelter will make payment; it is a concentrate valuable for one mineral or metal only. He might say: "In case the concentrate contains only one marketable metal" or "If only one marketable metal is recovered in the concentrate".

This precaution is especially important in the case of a pulley or gear, with which the length of hub exceeds the width of face, for in this case the side pressure comes directly on the hub.

Lamentable, is it not? He means:

"This applies especially to a pulley or gear that has a length of hub exceeding the width of face, for then the side pressure comes directly on the hub."

In the case of gold and silver ores, where the metal is enclosed in a vehicle of friable sulphide, this error should be carefully considered.

Did he have an idea of movement and was that why he used "vehicle"? The word he needed was 'matrix'. He might have written:

"In treating gold and silver ores, especially those in which the precious metal is enclosed by a friable sulphide, the possibility of this error should be considered carefully."

Abstract phrases introduced by 'with' are as common as they are undesirable.

The stamps drop through $6\frac{1}{2}$ inches with a frequency [at the rate] of 9.5 times per minute.

"Through", of course, must be deleted.

The surface is of a very uneven character.

Delete the words indicated.

The **soft nature** [softness] of the rocks

Any lumps of **more or less** [nearly] pure chalcocite were but superficially altered.

A mining journal says:

A **particularly** striking thing of the last Anaconda report is the exhibit of that company as the great metallurgical concern **that it is**.

The superfluous words are indicated. The statement can be amended thus:

"The latest Anaconda report exhibits that company as a great metallurgical concern" or

"This report exhibits the Anaconda as a great metallurgical enterprise."

Another author wrote thus:

So far as the writer is aware, the process has not been applied to any ore in this country, but there **can be no doubt that there** are many instances **where** it could be successfully applied.

This is a windy performance. What he wanted to say was:

"So far as I know, the process has not been tried in this country, but there must be many ores to which it could be applied successfully."

Probably flotation is due to a combination of phenomena **which** [that] are **rather high in the scale** of complexity.

"Probably flotation is due to a combination of complex phenomena."

From the standpoint of [according to] this theory

This is too important a matter to be treated **from a careless point of view** [carelessly].

Use the active, not the passive, voice of your verbs; use the direct phrase instead of the circumlocution; write like a man, not a nanny-goat!

He started **the accumulation of** a fortune in the lumber business.

This is a roundabout way of saying it; the direct way is
 "He started to accumulate a fortune . . ."

The smoke and gas **were the cause of** [caused] an immediate shut-down of the mine.

It is noteworthy as **being indicative of** [indicating] a tendency to diminish industrial unrest.

The Nevada Consolidated company is **carrying on the development of** [developing] the high-grade ore **encountered** [found] some months ago on the 700-ft. level of the Ruth mine.

I do not **make an exception of** [except] the recent election.

In Chile one must **take into consideration** [consider] the peculiar **problems that are met with** [local conditions].

Tests **resulted in** [caused] a change of plan.

The discharge **takes place on** [goes through] a grizzly.

I had some practice in the **preparation of** [preparing] exhibits for mining lawsuits.

The use of the gerund or the present participle instead of the corresponding noun is a favorite method of expressing the abstract idea instead of the concrete, thus:

The **escaping** [escape] of vapors [vapor] from leaky **piping** [pipes]

The use of the plural of "vapor" illustrates further a hankering for the abstract.

The **capping** [cap] has to be removed by **steam-shoveling** [steam-shovels] before the copper **ores** [ore] can be quarried.

A **capping** [cap] of leached monzonite covers the ore.

There **are** [is] no **croppings** [outcrop] of the vein to guide the prospector.

The **fillings** [fill] in the old stopes can be milled now at a profit.

The **faulting** [fault] extended across the entire series of veins.

The cave smashed the **heavy stulling** [big stulls] in the main stope.

The sulphide ore follows the east-west **fracturing** [fractures], until they are crossed by the main **faulting** [fault].

I closed the end of a piece of half-inch glass **tubing** [tube].

Abstraction is carried to inanity by scribblers who change

nations	into	nationalities
authors	"	authorities
events	"	eventualities
persons	"	personalities
characters	"	characteristics

It may be that such errors are due to a preference for words of many syllables, this hankering for sound rather than sense being a part of the literary disease by which the jargoneer is afflicted, and which he inflicts on his unprotected readers. Another sad trick is to mix the abstract with the concrete, using one verb for both, thus:

A knowledge of the methods of first aid and [the use of] a few medicines is of great value.

Do not compare things with qualities, the concrete with the abstract. Correspondence in form promotes lucidity and ease of statement.

This is the time for class blindness to cease leading the blind.

So says the editor of the San Francisco 'Journal' in a vain attempt to be impressive. What he meant I do not know; perhaps he wished to say that it was high time that class prejudice should cease to minister to ignorance.

President Harding, on June 5, 1921, sent a telegram to the people of Pueblo, in Colorado, where a flood had done great damage:

I am deeply distressed to read of the misfortune which has come with its toll of death and destruction to the citizenship of Pueblo and the valley of the Arkansas river.

He meant the 'citizens' or 'people' of Pueblo. If not, the condolence should have been sent to "the citizenship of Pueblo and the topography of the Arkansas", thus joining two abstract terms.

A New York publisher began an address thus:

Publicity and engineers do not mix.

This is profoundly true, although not in the sense that he meant. A headache cannot mix with pebbles nor a thirst with golf-balls. He meant to say that publicity and engineering are discordant, or that engineers have no liking for publicity.

C. W. Barron, in the 'Boston News Bureau', says:

H. Clay Pierce, the American who 25 years ago dominated the country in its oil interests, is now but a memory, with an oil refinery at Tampico that buys oil from the Eagle and other producing companies.

To be a "memory with an oil refinery" is to be memorable indeed, and to be a "memory with an oil refinery that buys oil" is even more astonishing.

A physicist of the U. S. Bureau of Mines writes:

In a previous article a bubble was said to be the "surface-tension of water surrounding a gas, usually air".

The gentleman was so pleased with his definition that he quoted it from one technical paper into another. The earlier definition read: "A bubble is simply the surface-tension of water surrounding a quantity of air . . . A clear understanding of this is necessary to all flotation considerations". What this last may be, one can only surmise; it refers presumably to the discussion of the physical problems underlying the phenomena [a phenomenon is a thing one does not understand] of flotation. Whether the gentleman helped to clear the understanding of his readers, I do not know; it is evident that his own understanding needed to be clarified; also his writing. How can a bubble, flimsy as it may be, yet a concrete thing, become such an abstraction as the tensile state of water? He may mean that a bubble is made of water of low surface-tension surrounding a gas; but one cannot be sure of that. I venture to suggest that a bubble consists of a spherical liquid envelope enclosing a gas.

The vein is several times the width of the drift.

He joins the concrete to the abstract, producing a mixture that has no value in engineering. He means:

"The width of the vein is several times that of the drift" or
"The vein is much wider than the drift."

An investigation showed that the gold content of the vein was contained in small veins enclosed within the strike of the large vein.

This is not a stupid joke; it is merely the product of a muddled imagination. 'Strike' is the direction referred to the

meridian. How can a vein be enclosed within a direction? Again the abstract is jumbled with the concrete. He meant, probably:

"An investigation showed that the gold of the ore was contained in the small veins within the lode."

The vicinity in which the above-described properties are located consists of metamorphic and eruptive rocks.

This is metamorphosed English pseudomorphic after jargon. How can a 'vicinity' consist of rocks or of anything tangible? In any event, the statement that the rocks are "metamorphic and eruptive" is of no consequence; he is merely using sonorous words to mask his ignorance.

Recent statistics are not to be depended on for a number of reasons.

Preposition-verbs are contributory to jargon because they are verbose and vapid. The two prepositions "on" and "for" come together in an awkward way. He means:

"Recent statistics are not reliable, for many reasons."

From a genetic point of view the genesis of the coralline limestone have [has] been most carefully studied.

Delete the words indicated.

The last three examples are taken from 'Suggestions to Authors' by George M. Wood, the editor of the U. S. Geological Survey.

Such words as 'case', 'instance', 'nature', 'degree', 'character', and 'condition' should be used sparingly and with discrimination.

So in the case of these veins we have present a reversal of the usual case where native copper turns to sulphide in depth.

This statement is typical of a kind of jargon that masquerades as ornate speech. He meant to say:

"Thus these veins reverse the experience usual in mining, namely, the change from native copper to sulphide mineral in depth."

In the case of copper it is not advisable to leach the ore.

"It is inadvisable to leach the copper ore."

In every case an alteration product should be identified with extreme care.

Delete the words indicated.

As Mr. Wood suggests, the victims of this habit of using 'cases' and 'instances', or some other similar abstract term, should ask himself what he means by the word. What is the concrete thing about which he is writing? He is likely to discover that he is indulging in mere verbiage.

The lowlands in some cases [places] contain lakes, the most conspicuous instances being Crystal, Glen, and Portage lakes.

Here "instances" is an elegant variant of "cases". It should be deleted.

This is the only instance in the district of a copper mine that is wholly in the granite.

"This is the only copper mine in the district that is wholly in the granite."

The miners returned to work in most instances.

They went to work in overalls. He meant: "Most of the miners returned to work".

Even in Carboniferous areas, only in one or two instances do the veins carry ore.

Substitute 'places' for "instances". Perhaps he means "only one or two veins carry ore".

The accident was due to the dangerous nature of the work and the fissile character of the rock.

It was not; the accident was due to the weakening of the rock by fissuring and the sudden fall of a large piece upon the miner working below.

A singular degree of mineralization marks the district.

Meaning that "intense mineralization characterizes the district".

The auriferous mineralization is distributed throughout the ore and consists of metallic gold and gold associated with iron pyrites.

This is thoroughly bad, from beginning to end. 'Mineralization' is the condition of being mineralized; how can a condition be "auriferous", that is, gold-bearing? Next, how can "mineralization" be distributed throughout the ore; it is an abstraction. Probably all that could be said was:

"The ore contains free gold, associated with pyrite." The "iron" is redundant.

The word 'situation' is favored by jargoneers; it is a type of the abstract, of the general, and of the woolly.

To meet this **situation** [difficulty] as it developed, **sand-filling** [the filling of stopes with sand] was introduced in 1908.

The same writer continues:

Previous to this date some of the older mines had been showing signs of movement, and it became evident that preparation was necessary to meet this **tendency**, which was bound to increase in intensity as mining progressed.

'Tendency' goes well with 'situation'; both are abstract terms—the mere fog of an idea. He meant to say:

"Previous to that year some of the older workings had shown signs of movement, so that it became evident that a systematic effort must be made to check the settling of the ground—a condition sure to become worse as mining progressed."

He first went to Goldfield to examine a **mining situation** [mine] and then **located** [remained or resided] there for good.

To examine a situation is like fighting a chimera.

"He first went to Goldfield to report on a mine, and decided to live there."

This serious **situation with respect** to dye-stuffs has been splendidly met by the chemists of the country.

"This serious need of dye-stuffs has been met splendidly by the chemists of the country", or

"This serious deficiency in dye-stuffs has been overcome with splendid success by the chemists of the country."

The **situation in regard** to fuel is so alarming as to call for the most careful consideration.

He means: "The shortage of fuel at this time is so alarming as to demand serious thought". The same writer continues:

Our **greatest** [best] opportunity for **success in meeting** the fuel situation [escape from the dilemma] lies in efficient combustion.

The fuel **situation** in Brazil is almost tragic in its seriousness.

"The lack of fuel in Brazil is almost an economic tragedy."

A mining lawyer writes:

An apex could not exist in **situations** [under conditions] **not greatly dissimilar** [similar] to those in the Jim Butler case.

The labor **situation** is passing through a period of unrest.

"Situation" is a mere abstraction; it is "labor" that is unrestful.

He took an option on an **interesting situation** [promising prospect] in the Canyon Creek district.

He liked the **situation** [mine or property] and decided to invest his money in it.

Probably he speculated with his money; to the unthinking, a 'speculation' is synonymous with an 'investment'.

The easing up of the oil **situation** was in sight.

"The passing of the crisis in the oil industry was assured."

To meet the situation with regard to the gold

This is jargon from end to end; he means, simply:

"To find the needed gold"

A trail from the [end of the] road **termination**

The fact is that **the presence** of water affects the electric conductivity of rocks more than **their own composition** [the substances of which they are composed].

It is not the presence of one thing or the composition of another that produces certain definite results but the concrete water and the concrete minerals.

As might be expected, the jargoneer loves such an abstract term as 'values'.

In my tests made with a view of [to] studying the form in which lay the values [the gold and silver exist] in such tailings I have been unable to detect any values [precious metals] in the tailing from our ore.

How would he make tests to determine "the form" of the gold and silver until he had ascertained the fact that they existed in the tailing? When a writer makes such statements, he is not to be trusted.

'Problem' is another word dear to the jargoneer in search of abstractions with which to obscure his lack of accurate knowledge.

One of our serious problems is clean water.

He means: "One of our chief hindrances [or handicaps] is the lack of clean water".

The problem presented by this difficulty engages the attention of metallurgists.

Delete the words indicated.

The water problem is a drawback to concentration.

"The large amount of water required is an obstacle to concentration."

'Standpoint' is a jargonistic decoration.

The portion of the range that is of interest from an economic standpoint extends due east and west about six miles.

"The portion of the range that is of economic interest extends due east and west for six miles."

'Eliminate' is another first cousin to jargon.

The presence of barite or gangue will in most cases eliminate the possibility of using gravity concentration.

He was writing about oil-shale, and meant:

"The presence of barite or other heavy minerals usually will obviate the use of gravity concentration."

One company has succeeded in treating this shale in a small retort, and is contemplating the installation of [planning to erect] a larger plant.

To "contemplate the installation" is rot.

The method has been employed in connection with the Herreshoff furnace installation.

"The method has been applied to Herreshoff furnaces."

The problem of water-losses was taken up coincidently with the stack-loss determinations.

He is referring to the metallurgy of quicksilver.

"The loss in water was investigated at the same time as the loss in fume."

The jargonist loves to use 'interests' as a mysterious synonym for a company, syndicate, or a group of financiers. According to him the Morgan 'interests' are underwriting a loan or the Guggenheim 'interests' have acquired control of a mine.

We learn from a consular report that the British interests [group] which [in] control [of the] railroad are [is] ready to begin construction.

'Interests' is an abstraction; it stands for something concrete, by which it ought to be replaced.

Golfers appear to write with a niblick; the result is a verbal fizzle. Thus W. Herbert Fowler says:

The tendency with regard to the game at the present moment, so far as courses are concerned, is more in the direction of making them interesting than of making them of abnormal length.

He means to say:

"The tendency today is to make golf-courses not longer but more interesting."

In a chemical journal I found an editorial that started thus:

The trustees of the funds of a tax-ridden people gambling on margin for a rise in a bear market is the spectacle presented by a repudiated

administration in enacting legislation to commit the American people not only to a policy of manufacturing a commodity for the benefit of a class under conditions that violate every instinct of business prudence, but to a precedent for the nationalization of industry whose logical eventuality, if not the condemnation for the benefit of agricultural interests of the plants of the International Harvester Co., would be the use of arsenals in peace time for the manufacture of agricultural implements, or of such products as any special class who at the time may be in dominance may require.

One is justified in supposing that the editor had surrendered his chair to the office-boy. This is the sort of thing one expects in the essay of a high-school sophomore. As Huxley said: "A good style is the vivid impression of clear thinking". Conversely, a bad style reflects the shapeless confusion of muddled thought.

It is likely that many of the examples quoted by me will seem to you by no means bad; in fact, they represent the kind of writing that is so common as hardly to elicit comment from those whose critical faculties have not been awakened; yet, I assure you, the avoidance of such jargon is essential to good writing. Jargon defeats its purpose; the thought fails to reach its destination; the cross-currents distract the tired reader's attention, they interrupt the voyage of his thought, which drifts with the flux of words and becomes stranded at last on a shoal of verbiage. Brevity is the soul of wit; conciseness is the essence of clarity; every unnecessary word is an obstacle to the transmission of thought.

XIII. THE WRONG WORD

Flaubert, as we know, laid stress on the selection of the right word, *le mot juste*, the precise epithet, the word that belongs to the thing. A sentence, or even a paragraph, may be spoiled by the use of a word that is not proper, that does not fit or is foreign to the meaning intended.

An Australian mining expert is reported to have said:

You have a property of considerable value, and what I saw warrants a good development of very rich **cubicular** galena, with gossan intermixed.

'Cubicular' means 'belonging to a small bedroom', a 'cubicle' being a sleeping compartment. He meant 'cubic', of course. This is a malapropism, and reminds me of the lady from Chicago that, on her return from Europe, said how much she had enjoyed the rural parts of France, because, among other things, it was "so delightful to hear the French pheasants singing the mayonnaise".

It is impossible to **amalgamate** coal-tar thoroughly with the pulp in the agitating-tank.

In metallurgy, 'amalgamate' refers to the combination of mercury with one or both of the precious metals, forming an amalgam, which is an alloy of mercury with another metal. It differs from other alloys, such as brass or bronze, in being made without the aid of heat, inasmuch as mercury is molten at the ordinary temperature. The word comes to us from the Greek through Old French and means 'something soft'. It is a mistake to use technical terms, having a specific meaning, for purposes that are foreign to that meaning. The writer of the quotation is not discussing any combination of metals; he is dealing with the physical process of mixing and is using 'amal-

gamate' wrongly as a synonym for 'mix' or 'emulsify'. The effect is confusing.

The **classical** formula $P=2\pi$ should be abandoned.

He was referring to a familiar formula in physics. 'Classical' refers to that which is of standard excellence in literature. 'Classic' means 'of acknowledged excellence'; it is not the right word in such a context, though preferable to 'classical', which usually connotes Greek or Latin. He meant no more than 'well-known' or 'generally accepted'.

The orebodies are reported to be more **permanent** than is usual in limestone.

If a thing be permanent, that suffices; it 'stays put', as it were; one thing cannot be 'more' permanent than another, but one thing may be either more or less impermanent than its neighbor, according as it is moved sooner or later. The geologist or pseudo-geologist whom I have just quoted did not mean 'permanent', but 'persistent'. 'Permanent' means 'lasting' or 'intended to last'; for example, a permanent foundation. When ore is found in a mine it is not intended to last or to be left where it is; the intention is to remove it to the surface for the purpose of extracting the valuable metal or metals that it may contain. 'Persistent' is 'to continue in a course'; when applied to ore it means 'continuous', as against 'patchy' or 'interrupted' in its extension.

The particles of mineral may become attached to the air-bubbles by means of which they are **float**ed up to the surface.

A thing does not float until it rests on the surface; the mineral particles rise to the surface by aid of the bubbles. I might use the word 'levitate', in opposition to 'gravitate', but unfortunately 'levitate' belongs now to the jargon of spiritualism.

Senator Harding will advocate measures designed to promote increased production of the **necessities** [necessaries] of life.

Of necessities there are too many already; it were cruel to make more. 'Necessity' means a state of need, the lack of

things that are indispensable; 'necessaries' means the things that are needed. This misuse of 'necessities' is common. In Spanish the same distinction obtains between *necesidad* and *necesario*.

The phenomenal **emergency** [emergence] of a great American merchant marine is one of the most striking economic consequences of the World War.

This is taken from Mr. Harding's speech accepting nomination to the Presidency. 'Emergency' means a 'sudden juncture demanding immediate action'. 'Emergence' means 'coming out of' or 'issuing from'. He meant that the creation of the mercantile marine was one of the extraordinary results of the war. "Phenomenal" is redundant; if it was "the most striking" it must have been highly extraordinary, which is the sense in which 'phenomenal' is used in this context.

The wolfram is of a very friable nature, and, as the quartz gangue is the **medium** of crushing the molybdenite, a happy **medium** has to be **struck** in the size of battery screens, care being taken to slime the wolfram as little as possible and to crush the molybdenite as much as possible.

The use of "medium" in two senses within the same context is a blunder; moreover, in both cases it is the wrong word, for the first "medium" should be 'means' and the second one should be 'mean'. The idiomatic phrase is to 'strike a happy mean'. The crushing is not done through the quartz but by means of the quartz, which abrades the soft molybdenite when brought in violent contact with it inside the tube-mill. The word "struck" is unfortunate because the ore is struck by the stamp in the mill, and it savors of a pun to say that 'a happy medium' is 'struck' in the "size of battery-screens". The phraseology as a whole is muddled and confusing. "Struck" means 'chosen'. The "very" before "friable" says nothing, for there is no standard of comparison. The entire statement needs re-writing, but it is so obscure that I hesitate to offer a substitute.

The old furnaces are being **torn out** and **substituted** with others of larger capacity.

A substitute is a person or thing that performs some function instead of another person or thing; the larger furnace would not be a substitute for the smaller furnace, because it would do more work in a given time, and it might do that work with greater metallurgic efficiency; that is, it would take the place of the smaller furnace with economic advantage. "Torn out" is not a word that fits this technical context. I suggest:

"The old furnaces are being dismantled and will be replaced by others of larger capacity."

One of the springs of unrest in Ireland is that the Land Acts have only been **partial** [incomplete] in their operation.

If Ireland has been governed badly, it is likely that the laws regulating the tenure of land have been administered with partiality; but as to that we are not meant to be informed in the foregoing quotation. The context shows that the writer intended to convey the idea that the Land Acts had been "only partly effective in their operation".

The Paris conference attempted **partially** to meet the issue by providing that the development of resources in mandatory countries should be managed to the best interest of all nations in the League.

The Paris conference may have acted partially or shown itself partial in some of its decisions, but the meaning here is 'incompletely' or 'without entire success'.

The temperature is much too high for **economic** [economical] practice.

'Economical' means cheap or thrifty; 'economic' relates to economics, or political economy.

The new method permits the **economic** [economical] leaching of the entire output of the mine.

I do not overlook the fact that the primary meaning of one word may be the same as the secondary meaning of another, but it should be obvious that the use of words in their primary meaning serves to clarify writing and also to enlarge the vocabulary of the writer by putting each word to its proper

function, whereas the use of words in their secondary meaning produces, or may produce, confusion; moreover, it has the effect of crippling the writer's vocabulary.

Words may have several meanings; most words have a primary or usual meaning, and after that they have their secondary meanings. Take such a word as 'economic'; it is the adjective corresponding to 'economics'—that is, relating to the science that deals with the production and distribution of wealth. 'Economical' primarily means 'saving' or 'thrifty', but it can also be used in the sense of 'economic'. Again, consider 'proposition'. Its primary meaning is a 'statement' or 'assertion', yet it is used commonly instead of 'proposal', a proposing of something, an offer put forward for consideration.

Now if we use the wrong word—that is the word that does not fit—we spoil our vocabulary. The man who uses 'economical' for 'economic' and 'proposition' for 'proposal' has only two words in his vocabulary, whereas he who uses these words in their primary meaning has four words at his service. Moreover, the man who uses words interchangeably, making them do duty for various meanings, will fail to convey his ideas as clearly as he who holds each word to its primary function. One can find other examples in the writings of mining engineers. For instance, 'locate'. Its primary meaning to a miner is to mark a claim; that is to say, its technical use is its principal function in affairs dealing with mining. Its common meaning, 'to establish in a place', is considered a secondary one by an intelligent writer on mining affairs, and for that meaning he chooses another word. A careless writer may say that "the mill was located" in the same context as the one in which he speaks of "locating the mill-site". In the first phrase he means that the building, with its contained machinery, was 'erected' or 'constructed' at a certain place; in the second he means that certain legal formalities were fulfilled for the purpose of securing the ground on which such a plant is to be placed. He will speak indiscriminately of "locating a claim" and of "locating the orebody", the latter signifying the

finding of the orebody or the obtaining of evidence that determines the position of the orebody.

It is best, in technical writing, to hold technical words to their technical meaning. We have seen how 'amalgamate' was used as a synonym for 'mix', although in the technology of metallurgy the word 'amalgamate' has a precise meaning—namely, the alloying of mercury with gold or silver. A technical writer should not speak of the 'amalgamation' of a group of companies or corporations, because he is distorting the precise meaning of a common technical term, and because he has other words, such as 'consolidation' or 'combination', at his disposal. Again, we read about the 'solution' of a problem and we are told that a problem is 'insoluble'. In chemistry, one of the sciences helpful to the art of mining, this word 'insoluble' means something that cannot be dissolved—in water, acid, or some other specified liquid. We have the word 'unsolvable' as the adjective appropriate to the solution of a problem; why not, then, use 'unsolvable' for the problem and 'insoluble' for the metal or mineral? If this be done, two words are available, each with its own distinctive meaning; thus we shall avoid the confusion of thought that arises when we are discussing problems of metallurgy in which the solving of troubles and the dissolving of refractory substances have to be discussed in the same context.

A **native** [domestic] supply of steel is assured in California.

A manufactured product is domestic; a natural product is native. Other similar distinctions may be noted: The word 'ship' is of the feminine gender; the animal 'mare' is of the female sex. The length of a line is stated in units of linear measure; the stretch of an ancestry is expressed in terms of lineal descent.

Like others of my **ilk** [fraternity or profession] I have devoted much thought to the subject.

'**Ilk**' means 'of that same', and is used when a person has

the same name as his estate, as Guthrie of Guthrie. The use of it in the above quotation is incorrect.

The German **vegetable**-fibre industry.

One might suppose that the word 'vegetal' did not exist; for it is rarely used. 'Vegetable' at once suggests carrots, cabbages, and peas, and so diverts the thought in the wrong direction. The adjective of 'vegetation' is 'vegetal'; we ought to speak of "the animal, vegetal, and mineral kingdoms". Neither flax nor hemp, neither sisal nor hennequin, is a vegetable, nor is it of vegetable origin; they are vegetal fibres. Asbestos is a mineral fibre.

The use of the wrong word causes a derailment of thought from the intended line of reasoning; it evokes an image that is incongruous. Every inapt word is an obstacle to the communication of ideas; it is like a hurdle that has to be jumped or avoided; the effort is tiring to the reader, and if it be repeated he may be pardoned for declining to proceed.

It may be argued that it is **unethical** [improper] for a Senator to be retained in a lawsuit of this kind.

An imposing word is used incorrectly. 'Ethical' means relating to morals or to the science of ethics. All that the writer meant was that the Senator's retainer was in bad taste or contrary to etiquette.

Since the **dawn** of cyanidation, the most surprising methods of anticipating the results of practical operations have been in vogue.

The poetic word "dawn" is incongruous with the remainder of the statement; it conveys no clear idea. The writer means "since cyanidation was first introduced" or "since the beginning" of the process. "Practical" is redundant. Another word frequently misused for the same purpose as 'dawn' is 'advent'. Thus:

The **advent** of the flotation process led to the reconstruction of the mill.

'Advent' is the season before the Nativity; it may be used figuratively for any important arrival, but it is inappropriate

to the introduction, beginning, or first application of a metallurgic process.

This method is applied **universally** [generally] throughout the province of Huelva.

Huelva is a province of Spain, not a universe. The word 'universally' is too comprehensive; it is a fine and large word that should not be used in a context wherein the idea of limitation is implicit. In this quotation it is redundant, for "throughout" suffices.

The results are good when the **universal** [general] high cost of operations is considered.

Here the meaning has a wider range, but even in this quotation the writer is thinking only of the copper-mining industry of the United States, not of the entire world.

The word 'cosmopolitan' is used in a similarly incorrect way. A man may travel around the world without becoming 'cosmopolitan'; on the contrary, he may be as provincial, even as parochial, when he returns as when he started on his journey. A gathering is not 'cosmopolitan' because it includes an American, a Frenchman, a Spaniard, and a Greek; it is only 'international' in its character, or of mixed nationality. A group of men of the same nationality may be 'cosmopolitan'. 'Cosmopolitan' means 'free from national prejudice' or 'belonging to all parts of the world'. It is used wrongly in the following, taken from a local newspaper:

To give a **cosmopolitan** flavor to the function a light refreshment was served, after which the joyous participants **departed for their domiciles** [they were too "cosmopolitan" to go home, of course] with the happy reminiscence of having spent a wondrous evening [and with the "light refreshment"].

In short, "a good time was had", as might be said by the society reporter of the 'Podunk Gazette', which probably would be considered locally a highly 'cosmopolitan' newspaper.

A word may be overworked, particularly by the illiterate, to such an extent as to render it undesirable in serious writing.

For example, 'eliminate'. This word is worked to death by every newspaper scribbler, so that the use of it becomes a tiresome vulgarity. It appears, with wearisome iteration, in descriptions of golf.

The last American professional was **eliminated** in the qualifying rounds of the tournament at Glen Eagles today. T. G. Renouf, of Manchester, **eliminated** Walter Hagen, of Detroit . . . Jock Hutchison was **eliminated** by Abe Mitchell.

To 'eliminate' is to 'remove' or 'get rid of'. Therefore the usage in the quotation is correct; but as the defeat of a player in match-play during a tournament involves his elimination, it is better to use the simpler word. I suggest:

"The last American was **eliminated** in the qualifying rounds of the tournament at Glen Eagles today. T. G. Renouf, of Manchester, defeated Walter Hagen, and Abe Mitchell won from Jock Hutchison."

In this way it was possible to wash the whole of the winter output and **eliminate** the collection of winter dumps completely.

Here "eliminate" is used for 'avoid' or 'cease' doing something—namely, the making of a winter dump, that is, the storage of gold-bearing gravel at a mine in Alaska. The adverb "completely" should follow the verb, otherwise it may seem to modify "collection".

A distinguished administrator, referring to the Federal Government, says:

We must proceed to the **elimination** of duplication of the work in the various departments.

Here again "elimination" is not wrong, but the use of two long words ending in 'ion' is ugly; moreover the active verb is stronger and clearer than the abstract phrase. He means that it is high time to stop duplicating.

The common misuse of 'eliminate' is illustrated by the following story:

Two men in a dining-car were ordering breakfast. The first one said to the waiter:

"George, you may bring me two fried eggs, some broiled Virginia ham, a pot of coffee, and some rolls."

"Yessa."

The other said:

"You may bring me the same."

"Yessa."

The second man then called after the waiter and remarked:

"Just eliminate the eggs."

"Yessa."

In a moment the waiter came back.

"'Scuse me, boss, but just what did you all say erbout dem aigs?"

"I said just eliminate the eggs."

"Yessa." And he hurried again to the tiny kitchen.

In another moment he came back once more, leaned confidentially and penitently over the table and said:

"We had a bad accident jest afo' we leave de depot dis mornin', boss, an' de 'liminator done got busted off, right at de handle. Will you take 'em fried same as dis hyar gemman?"

Twelve thousand persons watched these two young tyros in their battle for the big silver cup **on** which the names of leaders dating back to the beginning of things in golf were inscribed on it.

So says a writer in the 'New York Times' when describing the final match in the amateur championship. The two players were champions, one became champion at the end of the match that is being described and the other was an ex-champion; they were the very opposite of a 'tyro', which means a beginner or novice, from the Latin *tiro*, a recruit. Note that the writer himself appears to be a tyro in writing, for he repeats the preposition 'on' clumsily.

The average number of deaths in Mexico City **only** [alone] was 20,000.

At first the idea is that only 20,000 deaths were recorded, whereas the writer means that in the one city the number of deaths was 20,000.

The native women wear gay shawls and much **meretricious** finery; the men wrap themselves in blankets of brilliant colors.

This mining enterprise would have continued to prosper if the president of the company had not introduced his **meretricious** methods of mining finance.

Here a word that is deeply significant if used with correct reference to its derivation is applied carelessly and inaptly. 'Meretricious' comes from the Latin *meretrix*, meaning 'harlot'. To speak of the finery of the native women as 'meretricious' is to convey a suggestion that evidently is not intended. The writer meant 'gaudy' or 'bright'—nothing sinister was implied. In the next quotation the word is used in place of 'flamboyant' or 'tricky'; it is a usage not without precedent, but it is objectionable, because it spoils the word for effective employment, as for example, in referring to the prostituted journalism of Hearst and Brisbane.

Analysis of the underground workings shows that it will be necessary to dig through 731 ft. of drift that has caved.

This referred to the rescue of men in a mine that was on fire. "Analysis" is the wrong word. An 'analysis' is the separation of a complex thing into simple elements; the writer meant:

"An examination of the map of the underground workings shows that . . ."

'Lay' and 'lie' are used wrongly, partly because most people forget that 'lay' is not only a verb distinct from 'lie' but also the past tense of 'lie'. Moreover, 'lay' is transitive; it requires a direct object.

He **laid** [lay] awake.

The limestone **overlays** [overlies] the quartzite.

The choice **lays** [lies] between these extremes.

The hen **lays** the egg, and the egg **lies** where it has been laid. I am reminded of the story about the Boston terrier. A gentleman from the West said: "Lay down pup. Lay down, that's a good doggie. Lay down, I tell you". The dog was obdurate. A Harvard graduate overhead this, and remarked: "Excuse me, Sir; you'll have to say, 'Lie down'; he's a Boston terrier".

The ore-reserve was worked up to a maximum in order to permit the installation of a smelter.

Here we have an example of the use not only of an unfitting word but of one that is ridiculous in its incongruity. To 'install' is to place in a seat, a person is 'installed' when he is placed with ceremony in an office of importance. To use grandiose words, words so eloquent of dignity, in such a context is an abuse of language. The writer meant nothing more than the 'building', 'erection', or 'construction' of a smelter.

This process will **inaugurate** the production of oil from shale in the Rocky Mountain region.

To 'inaugurate' is to introduce a person to an important office with appropriate ceremony, or to initiate something of dignity or importance. It is a sonorous word befitting public affairs; it is not the word to use in a technical article, more particularly one that is of no consequence, as was the one from which I quote. A bishop is installed; a President is inaugurated. The simple word 'start' covers the meaning in the above context. Unfortunately, the silliness of much of the pompous scribbling of newspaper reporters is not recognized, otherwise ridicule would be the meed proper to such a statement as:

The Great Fake management proposes to inaugurate a vigorous campaign of development, and prosecute an extensive exploration, and then proceed to the installation of a large mill, in the confident anticipation of prolific dividends.

Such statements are common in mining papers. They are found elsewhere; for example:

Rachmaninoff's truly artistic playing, his wonderful interpretations, and his unique personality, all blended together in painting tone poems of infinite beauty, so eminent in color value that after striking the ear they progressed to the heart and nestled there.

The output has been maintained at a level not **pronounceably** [pronouncedly] below that of last year.

One can 'pronounce' a thing good, as well as pronounce a word correctly, but when something is done decidedly or em-

phatically, we use 'pronouncedly' to convey that meaning, as above.

The ore is **growing less rich** [becoming poorer] in depth.

The production has **grown less** [diminished] every year since then.

Growth connotes increase, the antithesis of shrinkage.

The economic geologist has been able to assist the miner **materially** in following his ore through the **vicissitudes** [vagaries] of folding and faulting if [where] the deposit was bedded or in sheet-form.

'Materially' has no meaning to fit this context; the use of it is a mere illiteracy. The writer means that the assistance has been considerable. 'Vicissitudes' refers to changes of fortune; it does not fit natural phenomena; he might use 'vagaries', which means capricious wanderings. I suggest:

"The economic geologist has been able to assist the miner in the effort to follow the ore amid the complexities of folding and faulting, particularly where the deposit was in the form of beds or sheets."

The last phrase reminds me of the Australian engineer and his "cubicular" galena!

The equilibrium between the oil **in** [on] the surface and the oil in the **volume** [body] of the emulsion . . .

The use of the wrong preposition indicates defective mental vision, and this inference is confirmed by the misuse of the word 'volume'. The contrast is between the surficial and the interior parts, between 'on' and 'in', between outside and inside.

In no other way can the cost of living be normal and an **equable** [equitable] division of the comforts of life be obtained for all.

The editor—for he was an editor—must have been thinking of the climate of California, where he lived. 'Equable' means 'not easily disturbed', 'uniformly even', or 'unvarying'. 'Equitable' means 'fair' or 'just'; and that is what he intended to say.

When we have a technical word for a specific purpose, we gain nothing by using another. For example:

This ore makes a most desirable diet [feed] for blast-furnaces.

Perhaps he was beguiled by apt alliteration's artful aid. In the zinc-mining district of Wisconsin they talk about "mill-diet". 'Diet' means 'a way of feeding' or a 'prescribed course of food', not the food itself. 'Feed' is a technical term signifying the ore and other materials that are put into a machine for metallurgic treatment.

Those who adopt the vernacular of the mining camp tear language from its literary moorings and set it adrift amid the shoals of ignorance, thus:

When special accuracy was demanded in surveying underground, as in locating an upraise to meet a shaft . . .

A 'raise' (or, better, 'rise') is an upward opening in a mine; the idea of 'up' is as implicit in 'raise' as the idea of 'down' in 'sinking'. 'Locating' here means the establishing of the place where the raise is to be started; surveyors use the technical term 'spotting' for this purpose, meaning the selecting of the spot at which to start. One can guess what is meant by 'meeting' a shaft, but the precise word is 'connect', which signifies the joining of two things. The engineer that made the statement as quoted is a scholarly gentleman, but he thought, I presume, that the use of such vulgarisms would give local color or a touch of familiarity to his description of mining conditions. He might have said:

"When special accuracy was demanded in the surveying underground, as in pointing a raise to connect with a shaft . . ."

In order to find how much a body of ore will pay, it is first necessary to find what is the lowest grade of ore it will pay to work. Without first finding this, the value of an orebody cannot be found.

He used the wrong word five times. The word 'find' is used aptly when referring to the discovery of ore, but in this quotation it is unsuited to the context. The first "find" can

be replaced usefully by 'ascertain', the second by 'determine', and the third by 'estimate'. The first "pay" is wrong; he means 'yield'. The second "pay" is colloquial. "First" is redundant. I suggest:

"To ascertain the total profit that can be won from a given orebody it is necessary to determine what is the lowest grade of ore that can be worked profitably; until this is done, the value of the orebody cannot be estimated."

The use of one wrong word leads naturally to the use of many that are equally ill chosen, for example:

Investors in Kimball's Kentuck and Kimball's Optimo Syndicates have had the value of their earnings doubled in just seven days.

Here we have an example of the purposeful misuse of words. Those who subscribe for the stock of an oil syndicate—that is, run the risk of allowing their money to be used by irresponsible promoters—are not investors; they are speculators; they may be gamblers. 'Investment' and 'investors' are words misused habitually by writers in the financial press.

He invested his savings in a Californian gold mine, and within two years won a competence for life.

Any mine that yields a person a fortune within the short period of two years is a gorgeous speculation, not an investment. If he put his savings into the mine recklessly, and without adequate information, he did not even speculate; he gambled. In the previous quotation the persons who profited temporarily from their plunge into an oil deal did not have "the value of their earnings doubled". The promoter who made the statement meant that his victims had doubled the amount of the money they risked; they did not "earn" anything, because their gain was not the reward of labor or of merit; nor did the "value" of their receipts increase, for 'value' is the worth of a thing. Moreover, the value of their dividends was much less than they supposed, because the money that was returned to them was not interest on their capital, it was not a true dividend, but a part of the money they and others had subscribed; it

was distributed among them for the purpose of deluding them into the belief that they were participating in a lucrative business, thereby prompting them to buy more stock at a fictitious price. Such terms as 'investment', 'dividend', and 'ore' are key-words in the economics of mining, and the misuse of them is the stock-in-trade of unscrupulous promoters. To 'invest' is to place money where it is safe, in the expectation of receiving interest on the principal; to 'speculate' is to take the risk of losing money in the expectation of increasing the principal, rather than to look for a return in dividends; to 'gamble' is to speculate recklessly, looking to luck rather than knowledge as the chief factor of success. A 'dividend' is the periodic return on capital invested; until the capital has been redeemed one can not know whether the intermittent payment of money from the profit of an enterprise be a dividend or only a return of part of the capital. 'Ore' is metal-bearing rock that can be exploited at a profit at a given time and place; it is a term in mining economics, not in mineralogy or in geology, and when used in these sciences it is without precise meaning, having reference to mineral that may possibly become ore if conditions favorable for exploitation supervene.

Since graduation from a leading engineering university, which includes a period of more than twelve years, I have been in the game of self-location of engineering positions. During this time I have relocated myself many times in various cities throughout the country.

This was the first paragraph of an article that was submitted to me for publication. It was returned as soon as the paragraph had been copied for the purpose to which I have put it here. The wording is so bad that the statement needs to be re-written, but I have marked a few of the obvious blunders. The period to which he refers 'covers', not "includes", the twelve years. To 'include' is to comprise or embrace something that is necessarily smaller. If the time had been lengthened to more than twelve years, it would include twelve or any less number; it did not, for it covered just twelve years, and no more. The "university" did not include the period; the

reference is to "Since graduation". The finding of a position for oneself is not a "game", unless it involve amusement or trickery. Incidentally, I may say that the use of the phrase "the mining game" for the business of mining is much to be deprecated, except when used by fakers and fraudulent promoters. A mining engineer should not refer to his own honorable profession as a "game", because it is neither a jest nor a diversion. "Self-location" is absurdly wrong as a word to express the obtaining of a professional appointment or position. This applies also to "relocated". A claim may be 're-located' when the time of the first location expires or the right to it otherwise lapses. When a man says that he intends to 'locate' in Chicago, for example, he is using a vulgarism that is particularly objectionable to mining engineers, because they use the term 'locate' to describe the technical operation of obtaining a preliminary right to exploit a piece of mineral land. What the writer probably meant to say was something like this: "Since my graduation from an engineering college—twelve years ago—I have been compelled to seek a position for myself several times and in many cities".

The Mary Malone Mining Co. has been **exploiting** its main vein at depth with a diamond-drill.

'Exploitation' and 'exploration' are words of distinctly different meaning, although newspaper reporters and other careless people seem to ignore the distinction. Sometimes, unfortunately, the typist or the compositor uses one in place of the other, especially if indistinct handwriting leave the choice open to them. To 'explore' is to examine or investigate; in mining it refers to various kinds of prospecting, as in the case cited by aid of the diamond-drill. To 'exploit' is to turn to account, to work or utilize a thing for one's benefit. An ore deposit is first explored and then, if it justify the further effort, it is exploited for the benefit of the owner of the ground or of those to whom the owner has transferred his rights.

Turning to something more pleasant, let me cite an example

of the fortunate effect of selecting the right word in an oratorical climax. The references that follow may be foreign to technical writing, but they will serve to illustrate the function of language in transmitting thought. The speaker was John Bright, a Quaker, a man simple and unaffected in all his ways, a political leader of acknowledged sincerity. He was addressing the House of Commons in 1855 on the subject of the Crimean War and the loss of life before Sebastopol. He said:

"An uneasy feeling exists as to the news which may arrive by the very next mail from the East. I do not suppose that your troops are to be beaten in actual conflict with the foe, or that they will be driven into the sea; but I am certain that many homes in England in which there now exists a fond hope that the distant one may return—many such homes may be rendered desolate when the next mail shall arrive. *The Angel of Death has been abroad throughout the land; you may almost hear the beating of his wings.* There is no one, as when the first-born were slain of old, to sprinkle with blood the lintel and the two sideposts of the doors, that he may spare and pass on; he takes his victims from the castle of the noble, the mansion of the wealthy, and the cottage of the poor. It is in behalf of all these classes that I make this solemn appeal."

The effect was tremendous: "It seemed", says the chronicler, "that the House was hushed to listen for the beating of the wings". As Cobden said to Bright afterward, "You went very near that time. If you had said 'flapping' instead of 'beating' of the wings, the House would have laughed". To which Trevelyan* adds: "But Bright could no more have said 'flapping' than Mr. Gladstone could have made a false quantity". Another great speech—a greater speech—may be instanced. In Lincoln's Gettysburg address will be found numerous examples of the fitting word, of the one word that is appropriate to the sense. At the moment, the long and florid oration delivered by Everett had impressed the audience more than Lincoln's short and simple utterance. As an English

* 'The Life of John Bright', by George Macaulay Trevelyan, p. 385.

biographer (Lord Charnwood) says: "The few words of Abraham Lincoln were such as perhaps sink deep, but left his audience unaware that a classic had been spoken which would endure with the English language". It will. Even in such a context as this I do not hesitate to quote the whole speech:

"Fourscore and seven years ago our fathers brought forth on this continent a new nation, conceived in liberty and dedicated to the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place of those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this. But, in a larger sense, we cannot dedicate—we cannot consecrate—we cannot hallow—this ground. The brave men, living and dead, who struggled here have consecrated it, far above our poor power to add or detract. The world will little note nor long remember what we say here, but it can never forget what they did here. It is for us the living, rather, to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here dedicated to the great task remaining before us—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion—that we here highly resolve that these dead shall not have died in vain—that this nation, under God, shall have a new birth of freedom—and that government of the people, by the people, for the people, shall not perish from the earth."

The key-words are "consecrate" and "dedicate," the "living" and the "dead". Behind the choice of the right words is the cause of the right choice, and that is sincerity, the sincerity that inspires all true art. Stephen Douglas could not have said what Lincoln said at Gettysburg, nor could Disraeli have spoken as Bright did. Without sincerity the words of a man are as sounding brass or tinkling cymbal.

XIV. CONSTRUCTION

The writing that is effective is woven with a fine texture into an agreeable pattern; it is free from knots, loose threads, and stray fluff. The instrument that weaves this literary fabric, whether it produce a homely sock or a lordly tapestry, a simple story or a learned treatise, is a disciplined intelligence, as sure as a steel needle, as precise as a swift loom. The simile breaks down at this point, for the product of the pen is instinct with the human spirit and therefore transcends in beauty anything made by a mere machine.

If words are to be woven into eloquent meaning, they must be well knit. Upon the relation of words to each other and of groups of words to other groups, known as phrases, clauses, and sentences, depends the success of writing as a means of transmitting thought from man to man. To be understood beyond question, you should know not only what your words denote but how to build your sentences; you must not only choose your words aright but construct your sentences properly. A sentence is a combination of words that makes complete sense; it says something about something. A clause is a subordinate sentence or a sentence within a sentence. A phrase is a group of words without a predicate; it makes sense, but not complete sense. For example:

I shall wait for a few minutes before I go home.

The whole statement is a sentence; "I shall wait" and "before I go home" are clauses; "for a few minutes" is an adverbial phrase.

The orderly arranging of words and of combinations of words is called 'syntax'; and from the original Greek form, *συNTAXIS* (*sūntaxis*), is derived the Greek name for an editor,

συντακτής (sūntaktēs), he that assembles. The proper marshalling of words is particularly necessary in English because our language is non-inflected, and in this respect it differs not only from Latin and Greek but from its modern rivals, French and German. This lack of inflection, to indicate the relation of words, makes it supremely necessary that in English our words shall be placed in correct order, for we depend upon the order to indicate the sequence of thought. Any deviation from the logical sequence may endanger the meaning; for example:

He agreed to be here last night.

This I overheard on the first tee of a golf-course. The speaker meant that on the previous night the other golfer had agreed to meet him at a given time and place on the following day. He meant:

“Last night he agreed to be here.”

Proper cooking will render safe foods otherwise dangerous.

In reading this passage, in a public address, the writer must have paused after the word “safe”, but even that would not remedy the error. The sentence should be re-written; it might be phrased thus:

“Foods that are dangerous if eaten raw may be rendered safe by proper cooking.”

When spies were feared in England at the beginning of the War a local paper stated:

The authorities are now looking for a gray motor-car driven by a woman who is thought to have a wireless apparatus inside.

A technical journal announced:

We publish an article on errors latent in the sampling of mines by Mr. Blank.

The mention of the author should have followed “article”; as it stands, Mr. Blank’s reputation as an engineer is endangered.

He blew out his brains after bidding his wife good-bye with a shot-gun.

Mrs. Smith was killed on Wednesday morning while cooking her husband's breakfast in a shocking manner.

The owner of this property fishes and shoots himself.

During the season one may see in the interior of South China yards of poor people full of peach-stones drying in the sun.

A string of vehicles loaded with apples a quarter of a mile long at a cider-mill is a common sight.

This suggests that the 18th Amendment and the laws of syntax alike are being ignored.

The concentrating table was covered by the foreman with a new face of rubber.

The samples were preserved for analysis in a paraffin-sealed flask.

Care should be taken to see whether such wells are contaminated by frequent analyses.

The foregoing examples of incoherence break the rule that the relation of each word and each clause to the context should be unmistakable. Another rule says: "Clauses that are grammatically connected should be kept as close together as possible". As a further warning I quote the following:

The expedition, which left Fairbanks March 13, expected to reach the summit of Mt. McKinley early in May, but was delayed three weeks cutting a passage three miles long through ice with hand-axes thrown across the ridge by an earthquake last summer.

That must have been a weird earthquake! It threw hand-axes across a ridge! Even if you place "with hand-axes" after "passage" you find yourself saying that the hand-axes were "three miles long". Note the slovenliness of style; the omission of 'on' before "March 13", of 'while' before "cutting", and of 'it' before "was delayed". The statement can be amended thus:

"The expedition . . . was delayed three weeks by having to cut with hand-axes a passage three miles long through ice, which had fallen across a ridge in consequence of an earthquake last summer."

It is simply amazing how much space in the newspaper persons who tread the conventions of society under foot can command once their sinning results in a suit at law or a murder.

This is out of joint; it is a jumble of phrases. He means:

"It is simply amazing how much space in the newspapers can be commanded by persons who tread the conventions of society under foot when once their sinning has resulted in a suit at law or a murder."

Place clauses in their logical order; an inversion of ideas may be confusing.

Combined with geological ability of an unusual degree, he was an all-around engineer.

No sensible man talks in this way; the phrasing is stilted and obscure. It is better to say:

"He was not only an all-around engineer but also an excellent geologist."

Compared with what I had seen in Nevada, Rhodesia is a poor goldfield.

This may be changed to:

"I consider Rhodesia a poor goldfield as compared with Nevada."

Because a process is cheap does not prove it desirable.

It is because he was a scientific man that he insisted upon research.

In these two examples the causal clause is made substantive, thereby producing an awkward inversion. It would be better to write:

"A process is not desirable merely because it is cheap."

"He insisted upon research because he was a scientific man."

Kelley says:* "It should be insisted on again and again that if two forms of expression are both open to criticism, the chances are very large that something else could be better than either. Begin anew, and hammer out for yourself a sentence to which you can think of no reasonable objection. So a young writer learns his trade, and so a veteran keeps his style fresh and clean".

I should delete "on" after "insisted"; also the "very"

* James P. Kelley, 'Workmanship in Words'.

before "large"; also "both"; again, I should avoid the preposition-verb "think of" and say "a sentence to which you can see no reasonable objection". However, the advice is admirable.

Logical order is the essence of syntax.

To hold the claims for a long enough time to allow of thorough prospecting.

"Long enough" should follow "time".

Air-lifts are often used.

He does not mean that they are used repeatedly; he ought to say

"Often air-lifts are used."

I cannot see any reason for compelling the prospector to patent his claim frequently before he knows it is worth patenting.

He does not expect the patenting to be repeated at short intervals; he refers to the repeated happening of circumstances that might cause the prospector to patent his claim before he has prospected the ground.

"I cannot see any reason for compelling the prospector to patent his claim, in the event—as happens often—of his not knowing whether it warrants the expense of patenting."

Due to the richness of the new orebody on the tenth level, the mine has paid dividends.

He means that "the mine has paid dividends, owing to the richness of the new orebody on the tenth level". As an alternative, I suggest:

"The richness of the new orebody on the tenth level has enabled the company to pay dividends."

This adverbial use of 'due', as the equivalent of 'owing', is common among the illiterate. A 'lady', when asked to sing, replied: "I cannot sing any more, due to surgery". She meant that she could not sing on account of the effects of a surgical operation on her throat. "Due to surgery" has the merit of brevity, but no other.

On the other hand, 'due' can be used properly in the following:

This was not solely **because of** the splendid genius of the great editor, but to . . .

"This was due not solely to the splendid genius of the great editor, but to . . ."

Take care that your demonstrative pronouns are made to refer to the right thing.

A number of mines have adopted the use of cars to take the place of 'cans'. These hold from 1500 to 2000 lb. apiece.

The second sentence refers to the "cars", not the "cans".

"A number of mines have substituted cars for cans. Each car holds from 1500 to 2000 pounds." Or, preferably:

"In a number of mines the 'cans' have been replaced by cars, each holding from 1500 to 2000 pounds."

Even the right word fails in its purpose if it be misplaced.

He advised the purchase at a low price and the storage of a sufficient quantity of quicksilver to supply the maximum needs for a period of two years.

The mention of "quicksilver" is postponed unduly; the order of "sufficient" and "quantity" should be reversed; thus:

"He advised the purchase of quicksilver at a low price, and the storage of a quantity sufficient to supply . . ."

A legislative committee of investigation reports:

We find insufficient evidence to justify the charge.

Does this mean that the evidence although insufficient appears to justify the charge? They meant to say:

"We fail to find evidence sufficient to justify the charge."

Referring to the organization participated in by Señor Corral and his friends. . .

The writer has misplaced his verb and entangled himself by the use of a preposition-verb. He might say:

"Referring to the organization in which Señor Corral and his friends participated . . ."

When many years ago work was started . . .

The "when" has been introduced too soon; it modifies the verb.

"Many years ago when work was started . . ."

The figures are from estimates made by the U. S. Bureau of Mines several years ago.

The phrase "several years ago" ought not to be placed so far from the verb that it modifies.

"The figures are from estimates made several years ago by the U. S. Bureau of Mines."

To Mr. Urquhart [is due] much of the British exploitation of Siberian mining districts during the last ten years is *due*.

The predicate is postponed too long, making an awkward break in the sense.

The Director of the U. S. Mint ordered the delivery of silver purchased under the Pittman Act at Denver.

It was not purchased at Denver, but ordered for delivery at that city.

"The Director of the U. S. Mint ordered the delivery at Denver of silver purchased under the Pittman Act."

This is awkward; so I suggest:

"The Director of the U. S. Mint ordered that the silver purchased under the Pittman Act be delivered at Denver."

It costs more to market the refined silver from the Perth Amboy plant in Denver than in Philadelphia, where it has been sold heretofore.

The Perth Amboy plant is a refinery in New Jersey; it is not "in Denver". He meant to say:

"It costs more to market at Denver the refined silver that comes from the Perth Amboy plant than to sell it at Philadelphia, as heretofore."

The means of travel are in summer the canoe and in winter the dog-train.

The indirection is disturbing to the reader because it is illogical.

"The means of travel are the canoe in summer and the dog-train in winter."

Here is another illogical arrangement:

Likewise the world's production of silver decreased only slightly, the difference being estimated at ten million ounces. This shows how much the vagaries of demand contrasted with the steadiness of the supply, for the price of silver ranged between \$1.38½ and 59½ cents during the past year.

The ideas are not presented in their proper order; the two phrases should be transposed.

Adjectives should follow each other in the order of thought.

The orebodies are easily mined and large.

The easy mining is the consequence of largeness, and that is the order in which the two ideas should be stated.

"The orebodies are large and easily mined."

The ore is subjected to costly and prolonged treatment.

Costliness is the consequence of long treatment. Such inversion of adjectives is tiresome to the reader and weakens the force of the statement.

While returning from the mine, a bandit attacked him.

The participle is placed too far from the pronoun to which it refers; the order of the sentences is inverted unnecessarily.

"A bandit attacked him as he was returning from the mine."

Being the son of a mining engineer nobody would have been surprised if Mr. Jones had sent his son to the Columbia School of Mines.

It was the son, not Mr. Jones, that was a mining engineer by heredity.

"Mr. Jones himself was a mining engineer, so that nobody

would have been surprised if he had sent his son to the Columbia School of Mines."

I shall not trouble you further, disliking controversy.

Here is another inversion. It is "I", not "you", that dislike controversy.

"As I dislike controversy, I shall not trouble you further."

"I shall not trouble you further; I dislike controversy."

The patient should be confined to a darkened room until his condition improves in order to avoid complications.

The last phrase should come first, because it states the purpose of darkening the room.

For a special study at Columbia University of some features of the secret directive control of wireless communication, Foundation made a small appropriation.

This illustrates a lack of "directive control" of mental communication. Such a curt and crude phrase as "Foundation", without even a definite article to introduce it, is uncouth. At least "the Foundation" is required, if it be understood to what foundation reference is made.

American public opinion will as a consequence of the new mediation ferment and seethe in the effort to answer such really enlightening questions

The adverbial phrase "as a consequence of the new mediation" should introduce the statement; when this is done the verb "ferment" will be joined to its auxiliary "will", thus:

"In consequence of the new mediation, American public opinion will ferment and seethe in the effort to answer . . ."

This caused a **selling trend** and a depreciation of market value that **under normal conditions** would not have occurred.

The adverbial clause should be placed near the verb that it modifies. The entire sentence needs to be re-written.

"This stimulated selling, and caused a depreciation such as would not have happened under normal conditions."

Relative pronouns are used belatedly by some writers, thus:

An extensive study of the problem has been made by Mr. D. Harrington of the U. S. Bureau of Mines, [and] an abstract of a lengthy paper by whom [him] appears elsewhere in this issue.

Here is an example from the 'New Republic':

Our men of wealth have accepted **profits and income taxation** with a better grace than those of any European nation, with the exception of England.

The reader wonders why it is necessary to say that rich men have accepted "profits and income", and is jarred by the statement before he reaches the word "taxation". The quotation is an example of sloppy writing. 'Rich men' is better than "men of wealth"; 'except' is better than "with the exception of". The writer wallows in indirect reporter-like phraseology. He might have written:

"Our rich men have accepted the taxation of their profits and incomes with better grace than have those in Europe, except the English."

Similar suspensions are common in technical writing.

As between fine and coarse ore crushing, he recommended the Gilpin county type of deep-mortar long-drop stamps.

Here the interposition of "fine and coarse ore" suspends the sense until "crushing" is reached; similarly a long adjectival phrase intervenes between "recommended" and "stamps".

"As between crushing fine or coarse, he recommended stamps of the Gilpin county type, that is, the use of a deep mortar and a long drop."

In the hard ground at Miami it is advisable to use a **wide shrinkage stope and pillar system**.

Here the five words preceding "system" are adjectival, suspending the sense too long. It would be better to write "system of wide shrinkage-stopes and pillars".

In sending in an order it was **very necessary** to give **full shipping and marking directions**.

"In" and "very" are redundant. The four words preceding "directions" are an adjectival jumble. He might have written:

"With an order it was necessary to send full directions for shipping and marking."

Directness of statement is an aid to clearness. As Horatio Tooke said: "The first aim of language is to communicate our thoughts; the second, to do so with dispatch".

So the new order strikes at the root of much of the difficulty that has disturbed the industrial world since the War began by applying only to the unskilled.

The phrase at the end should be interpolated after "order" which it explains.

It might have been appropriate to have **developed** [provided that these particular resources of manganese and platinum, so forcibly cited as an argument for shoving the Bill through the Senate, [should be developed] under the direct control and management of a Government bureau for the pecuniary benefit of the actual owners in law and equity.

Here the principal word, "developed", has been misplaced so as to mar the entire statement.

What is regarded as a significant fact is that **as yet** the President has not [yet] officially announced the re-establishment of the present price effective from June 1 to August 15 **although the War Industries Board has so recommended.**

It was the disregarding of the recommendation by the Board that was the significant fact, therefore the statement should be re-arranged thus:

"It is significant that the President, notwithstanding the recommendation of the War Industries Board, has not yet announced the official re-establishment of the present price effective from June 1 to August 15."

An applicant had to file a copy of these regulations, to show that **he had been complied with.**

He means: "to show that he had complied with them".

Before a hole drilled in the manner described is blasted, the hole is sprung by exploding in the bottom of the hole several charges of dynamite

The clause "drilled in the manner described" is interjected awkwardly; it is superfluous. The statement can then be corrected thus:

"Before the hole is blasted, it is 'sprung' by exploding several charges of dynamite in the bottom."

'Sprung' is treated as an unfamiliar term and is explained by the last clause; therefore the single marks of quotation are desirable.

After a hole has been chambered sufficiently, the amount of which depends on the depth of the hole, the hardness and the tenacity and the volume of the rock to be broken, the hole is loaded for the final blast.

This statement contains several unnecessary inversions. The comma after the second "hole" is not followed by a second comma after "hardness", so that the continuity of the statement is broken. He might have written:

"The hole is loaded for the blast after it has been chambered sufficiently, this depending upon the depth, as well as upon the hardness, tenacity, and volume of the rock to be broken."

The lead-silver plant of the Burma Mines company, up to the spring of 1919, when I left Burma, had experienced many difficulties caused by the war in that region, so remote from manufacturing centres.

There was no warfare in Burma in 1919; he means that the War in Europe, and elsewhere, had caused difficulty in buying and transporting supplies from the manufacturers to the mines.

"When I left Burma, many difficulties had arisen in the operation of the lead-silver plant of the Burma Mines company on account of the War, which had interfered with the sending of materials and supplies to a region so remote from manufacturing centres."

A dispatch from London on September 1, 1921, said:

England awoke today officially at peace since midnight with all countries except Turkey and the hated Defence of the Realm Act known during the war by its maiden name [Dora] was a thing of the past.

Here two discrete ideas are jumbled together; one refers to the declaration of peace and the other to the repeal of a law.

Concord is essential to good syntax; the parts of speech must be in agreement; a verb, with its subject in number and person; a pronoun, with its antecedent; and so forth.

To be eligible for additional insurance, the company requires each worker to deposit a portion of **their** earnings in the savings-bank.

"Their" should be 'his', for the reference is to "each worker". The whole statement is badly arranged.

"The company requires each worker, before he becomes eligible for additional insurance, to deposit a portion of his earnings in the savings-bank."

As a matter of fact there are three Alaska territories differing so radically in topography, climate, resources, and social conditions that no general description will convey a true conception of **either**.

The "either" should be 'any one of them', for three, not two, diverse Alaskan regions have been mentioned.

The soldiers returned the fire of their assailants and several pedestrians, including a young girl, **was** wounded by the flying bullets.

Several *were* wounded. A comma is needed after "assailants", because a separate idea is introduced.

Few authors are more clear than Tillotson and Temple yet neither of them **are** [is] remarkable for precision.

I went to a region in China where eleven dialects were used, so distinct that for each [an] interpreters [interpreter] **were** [was] necessary.

The English at home, especially the marmalade-makers, at first rejoiced at the idea of getting sugar for less cost at the expense of **her** [their] continental rivals.

If he had said that "England rejoiced at the idea", he could have used "her" correctly; as it is, the reference is to "the English", therefore 'their' is required.

Why should a noble and puissant nation, rousing **herself** like a strong man after sleep and shaking **her** invincible locks take this intense, this morbid interest in **its** fading aristocracy!

This is quoted from 'The Athenæum'. It is a remarkable example of discord. A nation is first feminine ["herself"] and

then neuter ["its"]; at the same time the nation is like a strong man shaking "her" locks.

The magnificent tribute paid to the French republic and its eloquent representative on the eve of his return home reflected the goodwill of the delegates. The friendly attitude of the United States toward *her* champion was clearly outlined by the concluding statement of Secretary Hughes.

The confusion of gender is due to the fact that the "its" refers to the "French republic" and the "her" to "France", which the writer had mentioned in a preceding paragraph. If he had referred to M. Briand as the eloquent representative of "France", instead of the French "republic", he would have avoided the blunder.

Yet enough data *has* [have] been secured to furnish a knowledge of the gradual hardening.

This discordance is extraordinarily common among engineers, who, of all people, ought to know that 'data' is the plural of 'datum', because 'datum' is a term used in engineering. "A knowledge of the gradual hardening" is not what he means; he means "a knowledge of the cause of the gradual hardening". Even in 'Science Progress', supposedly a scholarly publication, I find:

This exceedingly scanty **data** is all there is, at the moment, to discuss. Here is another:

This book contains a **good deal of** [many] statistical data.

G. K. Chesterton writes:

A special enclosure where a special sort of lions **are** gathered together.

The subject of "gathered" is "sort"; one might say, "where lions of a special sort are gathered together".

William Smith is one of those engineers who is unwilling to assume even a reasonable risk in mining.

Evidently there is a discordance, because "engineers", not "one", is the antecedent of the relative pronoun "who".

The ties of kindred, corroborated by habit, *was* [were] not the only thing that united them.

Here the error is made probably by taking "habit" as the subject:

The prospects for the young engineer fortunate enough to find **an** opening **seems** very favorable.

The verb is so far from its nominative that the obligation of concord is overlooked.

The use of a plural verb immediately after a plural noun that is not the subject of the verb is a common slip; it is caused by the attraction of nearness. The discordance is due sometimes to applying the same verb to two clauses:

My leisure was considerable, and my emoluments [were] large.

As each item in the index has a number, one must have **the** whole year's abstracts beside **you** [one] to find any particular reference.

The "you" should be replaced by 'one', to be in accord with the previous use of "one". However, the pronouns are not required; for example:

"As each item in the index has a number, the whole year's abstracts are needed for the finding of any particular reference."

One must not be too confident of **his** [one's] own success.

There should be a limit of claims **one** could locate in a new district, but one should be allowed to hold and group all **he** [one] can buy, or all **he** [one] can stake in an old district.

The repeated use of the indefinite pronoun becomes wearisome; it would be better to use a noun at the beginning and then follow it with the regular third personal pronoun, thus:

"There should be a limit to the number of claims **a** person may locate in a new district, but in an old district **he** should be allowed to hold and group all **he** can buy, or all **he** can stake."

No one would take it upon **themselves** [himself] to separate **them**.

Under less benign or easy-going auspices than **that** [those] of **England**, **he** would have been denounced as a traitor.

"Auspices" calls for "those".

The agenda in itself is a complete review.

"Agenda" is plural; it means 'things to be done'. Change to "the list of agenda", whereupon the meaning will be clear and the verb "is" will be in agreement.

Another advantage is seen in the friendly rivalry between a large number of companies and their staffs.

This refers to conditions at Johannesburg. The rivalry is not between the companies and their staffs, but between the staffs of the various companies.

This is essentially a business, a practical age.

He means the word "business" to qualify "age", but the result is awkward; it were better to have two adjectives in agreement, thus:

"This is essentially a busy and a practical age."

The word "busy" may not carry the connotation of "business", perhaps 'commercial' would be better.

He saw these issues more clearly than any [other] man.

No **other** man in the country has done more to advance the study of economic geology.

In the first quotation the 'other' is needed; in the second, it is worse than superfluous.

An intelligent interest in the rules of composition need not stiffen the writer's manner, nor make him pedantic. When engaged in writing, do not cripple yourself with too much thinking of the things that you should avoid. Try to express yourself clearly, and leave the critical emendation, whether of words or of construction, until you have written what you want to say. When a golfer is about to drive, he does not bethink himself of the half-dozen things necessary to the desired result; he takes a firm stance, he keeps his eye on the ball, and swings freely, but not wildly. The simile holds good. Assume a definite mental pose, keep your mind on the purpose of your writing, and express yourself naturally. In golf, however, when once the ball has been hit, it cannot be replaced; the

stroke cannot be recalled. In writing, you have a chance to revise. Make the most of it.

An important factor in good syntax is the right use of connectives, the conjunctive words and phrases that unite sentences and carry the sense forward logically.

The lead and most of the zinc and sulphur were driven off, [whereas] the gold, silver, and copper **being** [were] left in a matte.

Although the proportion of free mineral lost in the tailing was much higher in Section 3 than in Section 8, [thereby] suggesting that more careful attention to the operation of tables and classifiers might alter the final result, [nevertheless] Section 8, using the Steptoe flow-sheet, effected a better recovery of copper.

This refers to the operations of a mill in which copper ore was being concentrated. Note how the three separate ideas are brought into contrast by the introduction of 'although', 'thereby', and 'nevertheless'. Without them the meaning would be confused by the running of one clause into the other.

Some companies have adopted similar secretive methods abroad; [, but] the average Spanish-American is disposed to be suspicious of foreigners, and [, therefore] such secrecy encourages conclusions that are unwarranted.

The increased popularity of the air-lift resulted from an appreciation of its simplicity and economy, and **because of** [from] a better understanding of underlying principles.

Mr. Blank endorses the prospector's plaint. He believes that the new regulation will play into the hands of the land-grabber **and** recites an incident from his own experience to show how the cheaper kind of mining stocks are boosted on the local mining exchanges.

The 'and' is misplaced. The first two sentences should be joined, because one is supplementary to the other; but the last deals with an entirely discrete idea and should be kept separate. Therefore I suggest:

"Mr. Blank endorses the prospector's plaint, for he believes . . . land grabber. He recites an incident . . ."

The assay-maps are brought into the office, **and** [where] the averages are computed.

Editorial pages which have not been prostituted to private purposes, which are not mere mouthpieces for the predaacious few.

An 'and' is needed after "purposes", to join the two statements, which are joined in thought. The omission of 'and' causes "which" to refer to "purposes".

The capitalist has ceased to take **mere** romance as security, **and** [he] demands facts and figures.

"Mere" is redundant; it only detracts from the force of the statement. The connective "and" is out of place; what is needed is an adversative, such as 'on the contrary'. Opposition of ideas can be indicated by a semicolon, thus:

"The capitalist no longer accepts romance as security; he demands facts and figures."

Nowadays one has but to enter a drug-store to satisfy a desire for about everything from drugs to books and furnishings. **Similarly with** the press.

He has made an unsuccessful effort to carry forward the idea, of comprehensiveness of supply, so as to include the press among the amplitudinous agencies of distribution. The last phrase is too curt; it is unfinished. He might have said:

"Much the same is true of the press, for in the newspapers and magazines one finds information on all kinds of subjects."

Mr. Blank was good enough to pass your book 'Technical Writing' over to me **since** [because or knowing that] I shall probably conduct a course in English for engineering students next semester.

The formula is of little value, **as** [because such] interfacial tensions **like that** cannot be determined experimentally.

It is not a 'trust', **and** [because] it does not control the iron and steel industry of this country.

The 'because' might be left understood:

"It is not a trust: it does not control . . ."

And that, **as** man **as** an animal species is subject to the control of the same major evolutionary forces **which** [that] control the other animal kinds, [so] his evolutionary progress, or fate, is to be decided on the basis of a rigid, relentless natural selection.

The opposition of ideas is not indicated clearly. 'As' one thing happens, 'so' another results. The first 'as' is a conjunction, the second a conjunctive adverb. The use of the same

word for two functions and in immediate context is awkward. The phrase "as an animal species" is not needed, the animal nature being suggested by "other animal kinds". The comma after "rigid" may be replaced by 'and'.

Dangling participles are among the worst of solecisms, because they obscure the sense.

Oil-fuel is **not** [neither] subject to spontaneous combustion, nor capable of ignition in bulk. **Dependent upon** the temperature, however, oil-fuel has the tendency to vaporize and form an explosive mixture with air.

If 'neither' is used, the comma after "combustion" can be deleted. "However" is a connective, but it is misplaced.

"If however the temperature be high enough to vaporize the oil, it will form an explosive mixture with air."

Not expecting us, the horses had been turned out to pasture.

This is borrowed from James C. Fernald's 'Expressive English', where the author quotes it from "a very spirited and entertaining writer". The statement suggests that the horses should have been notified in advance; what is meant is that, "as our friends did not expect us, the horses had been turned out to pasture". Therefore:

"Our friends not expecting us, the horses had been turned out to pasture."

Even this is clumsy; so Dr. Fernald suggests:

"As our friends were not expecting us, the horses had been turned out to pasture."

Engaging in mining in Colorado, his technical ability had brought him to the top of the profession.

This use of the participle with a possessive pronoun is defensible, but it is well to avoid it, for it leads to worse aberrancies, such as:

Being the belle of the town, he lost no time in making Miss McCarthy's acquaintance.

This is quoted by Hill. The student who wrote it meant to say:

"As Miss McCarthy was the belle of the town, he lost no time . . ."

Riding on a mule, clad in a miner's suit of overalls, smoking a black pipe, we had no idea that he was the president of the company and the head of such a splendid enterprise.

"We" were not riding on the mule. One might say: "*Seeing* him on the mule, clad . . . pipe, *we had* no idea", for now we have some co-ordination. It were better to avoid the participial introduction, thus:

"When we saw him on a mule, clad . . . pipe, we had no idea that . . ."

After disposing of a hearty dinner our horses were brought to the door.

It was 'we' that had disposed of the hearty dinner, not the "horses".

"As soon as we had finished a hearty dinner, our horses were brought to the door."

The fault of coupling a participial phrase with a word with which it has no connection in thought is an offence against clearness as well as unity, says Hill.*

The improper placing of prepositions is the cause of unnecessary complications.

Few of the men we are cringing before have any real ability.

He means: "Few of the men before whom we are cringing . . ."

He was in favor of interpreting the treaty in a different manner to what the other signatory may interpret it.

"To" should be 'from', and the 'from' should be placed thus:

"He was in favor . . . treaty in a manner different from that of the other signatory."

He will be a different Ambassador from the conciliatory men of the last fifty years whom he succeeds.

* A. S. Hill, 'The Principles of Rhetoric'. Page 214.

So says the editor of the 'Spectator'. Shades of Addisor and Steele! He was writing of Mr. George Harvey, and meant to say: "He will be an Ambassador different from the conciliatory men whom he succeeds". He does not succeed the "fifty years". In order to include that thought let us say:

"He will be an Ambassador different from the conciliatory men that have preceded him during the last fifty years."

The Rand presented different conditions **than** any that had heretofore occurred in my experience.

"Different" should follow "conditions", and "than" should be replaced by 'from', thus: "The Rand presented conditions different from any that had heretofore come within my experience".

Labor is not very plentiful here **any more** than in other parts of the world.

"Labor is no more plentiful here than in other parts of the world."

'Similar to', like 'different from', is frequently divided, with unpleasant consequences.

Writing in a **similar** column to this in the 'Boston Transcript', E. F. E. says . . .

The "similar" should come between "column" and

In Rhodesia, in a **similar** vein to this, I found crystals of native gold.

The same criticism applies; it applies also to other adjectives that require a preposition after them.

Add the flux in an **equal** proportion to the ore.

"Add the flux in a proportion equal to the ore."

Proceed in a **parallel** direction with the crest of the range.

"Proceed in a direction parallel with . . ."

He adopted an **opposite** policy to that of his friends.

"He adopted a policy opposite to that of his friends."

This was an **adverse** decision to the plans we had formulated.

"This was a decision adverse to the plans . . ."

He indicated that more favorable conditions for the enterprise might be expected.

The wrong preposition is used and it is separated from its adjective.

"He indicated that conditions more favorable to the enterprise might be expected."

Connectives should be placed carefully, and when used in couples they must correspond.

BOTH . . . AND;

I went both because I feared and because I hoped.

EITHER . . . OR;

They are sure to come either too early or too late.

He either could not nor [or] would not undertake the task.

This plant was erected either hurriedly or carelessly.

The division of profits made by either governments, banks or industries . . .

Delete "either" and insert a comma after "banks".

Either in the city or in the country . . .

Do not fail to repeat the preposition.

Poets are either born in London or remote country places.

The "either" is misplaced and 'in' is omitted before "remote."

"Poets are born either in London or in remote country places."

The ore will be treated by the 'double chloride' or Elmore process.

This leaves it uncertain whether or not one process is meant; namely, the 'double chloride' process of Elmore. He means.

"The ore will be treated either by the 'double chloride' or by the Elmore process."

NOT MORE . . . THAN;

The result was not more surprising than pathetic. ..

NOT ONLY . . . BUT ALSO;

This was **not** only according to law, **but also** according to justice.

NOT . . . BUT;

Criticism was **not** directed against the spending of so much capital, **but** against the poor results achieved.

The apposition can be made clearer by placing the "not" after "directed" instead of before it.

ON THE ONE HAND . . . ON THE OTHER HAND;

On the one hand, he faced the loss of his fortune; **on the other**, of his honor.

NEITHER . . . NOR;

Neither he **nor** I will accept the offer.

I looked **neither** forward **or** [nor] back.

The support of research of such nature as not to be undertaken by an industrial corporation, the Government, **nor** [or] a university.

The shapes vary in width from a single set to 15 sets, **or** [that is,] from 6 to 110 feet.

These seem small matters to the slovenly writer, but they are of the essence of clear writing. As Kelley says:

"No great difference? There is no great difference between lifting two pounds and lifting one pound; but I will not have my shoes weighted with lead. In the single and simple case, no great difference; but construct a complicated sentence in defiance of the laws of thought, or a long discourse with constant disregard of what is normal in structure and formally clear, and the reader will be wearied and repelled, unless your work is in other respects so good as to please him in spite of your slovenliness—and even if you please him, very likely you will have failed to make him understand you, and thereby to persuade or convince or instruct him as you would wish to do."

Young writers drift easily into long sentences, entangling their ideas in a wilderness of words. They shun the short sentence, preferring to link one thought to another by the aid

of many 'ands', as an after-dinner speaker ekes out his lame remarks with a frequent 'urr' or 'err'. Don't be afraid of short sentences or of using the period.

This quality of diffusion indicates molecular mobility; **and** a good example of this is furnished by . . .

"This quality of diffusion indicates molecular mobility, a good example of which is furnished by . . ."

The methods employed in the underground work vary with the nature of the ore deposits **and** have been developed to suit the local conditions encountered in the various mines.

This is verbose and confused.

"Mining methods have been developed to suit local conditions as modified by the varying structure of the ore deposits."

At the Zaaiplaats tin mine the cassiterite has mainly occurred in the Red granite; **and**, the author particularly noticed that the color of granite round the pipes was often a much deeper red; **and**, that a great deal of tourmalinization had taken place.

This requires several corrections:

"At the Zaaiplaats tin mine, the cassiterite is found chiefly in the Red granite. The color of this granite is deeper in places around the pipes [ore-chimneys], where also tourmalinization is marked."

Similar errors are made by men that cannot claim lack of experience in writing. Here is a shocking example from the 'Times', of London:

The cities we remember from childhood, unvisited since, grow in our minds **and** become glorious **and** visionary. The memory itself is only a material which the mind uses, as in dreams it uses some fact of waking hours. There was a bridge, perhaps a mean iron bridge, **and** a few trees, **and** some decent houses beyond it. But all the mean details are forgotten, **and** the scale is so altered that the bridge seems to have spanned a deep valley with great arches, **and** to have been a causeway leading into a city of palaces **and** overshadowing trees. **And** along the causeway crowds were drawn into the city **and** traffic coming from a great distance, as if to a festival. **And** there is a memory also of the sky itself as momentous—towering clouds flushed with the sunset, **and** the causeway shining after

rain, and all the people in the streets enjoying the beautiful hours, with music [that was really a German band] adding a glory of sound to the glory of light and form and movement.

The excessive use of 'and' spoils an excellent piece of prose. 'And' is used as a feeble continuative by writers uncertain of the relations between their ideas.

Let us try and [to] help.

It is too expensive a proposition to try and [to] introduce a high-grade article.

He told him to be sure and [to] attend to the matter.

Jackson went and examined the pump.

That might be true; he might have gone toward the pump and then incidentally he might have examined it; but what the writer meant was, simply:

"Jackson examined the pump."

Occasionally an 'and' is lacking:

For the sterilization of malaria 'carriers', and for the 'follow-up' treatment of ordinary cases, the administration of 10 grains of sulphate of quinine, every evening before retiring [and] for a period of eight weeks, has been adopted as standard.

Without the 'and' it would appear as if the patient retired for a period of eight weeks.

When costs in California and Europe were compared—\$75 here and [as against] \$40 for imported Spanish mercury—it became evident that an import duty was desirable.

It is sometimes [may be] found that the screening from one lot of ore is sufficiently rich to be shipped with the selected ore and [whereas] that from the next lot will be [is] too poor.

Practically all the belts are 30 in. wide, 7-ply, and have $\frac{3}{16}$ in. rubber cover on the carrying side, and $\frac{1}{16}$ in. on the pulley side.

We see what he means, but it can be said more clearly:

"Nearly all the belts are 7-ply and 30 in. wide; they have a $\frac{3}{16}$ -in. cover of rubber on the carrying side and $\frac{1}{16}$ -in. on the pulley side."

The mining world is indebted to the initiative of John Wiley & Sons for meeting so great a want, and they have been fortunate in securing the

services of Mr. Peele as the guiding spirit to translate the conception into achievement.

Here the "and" is introduced to correct a badly organized statement. When re-written it reads thus:

"John Wiley & Sons have placed the mining world under obligation by their initiative in meeting so great a want; they have been fortunate in securing . . ."

Wet methods of treating the concentrate were not at all satisfactory, as there was a large amount of black residue in the concentrate that could not be decomposed by sulphuric acid and ferrous sulphate, **and which** carried high silver values.

If "which" is replaced by 'that', the last clause will refer back to "residue", but the chief fault lies in tying an important assertion to the end of the opening statement by means of the 'and'. He means:

"Wet methods of treating the concentrate proved unsatisfactory because it contained a large proportion of black residue, rich in silver, that could not be decomposed by sulphuric acid and ferrous sulphate."

It is obvious that the calculations can be shortened when one set of apparatus **and** conditions are used continuously for analyses.

He is connecting unlike ideas in a confusing manner—the abstract with the concrete.

"It is obvious that the calculations can be simplified by using the same apparatus under identical conditions throughout a series of analyses."

Sentences without logical connections should not be linked by a feeble 'and'. The reason for the connection should be made clear by using the proper connective or by inserting an explanatory clause.

For the retorting of lean shale, the Scottish retort gives fairly satisfactory results, but it is by no means perfect, **and** [although] it has been claimed that it is possible to **so** [so to] improve the retort as to make it less costly both to construct and to operate.

The construction is bad, even when corrected; 'it' is used too many times and confusedly.

It is certainly not wise to construct small plants **which** [that] are to be operated to recover both oil and nitrogen contents, **and** it will be especially poor business should it be also necessary to manufacture the acid required for the production of ammonium sulphate.

"Certainly it is not wise to erect small plants that are to be operated to recover both the oil and the nitrogen contents, more particularly in a locality where it becomes necessary also to make the acid required in the production of ammonium sulphate."

There are streaks of hard material mixed with the softer and F. E. Grant, the superintendent, assures me that the breaking is by no means easy.

The hard stuff seems to be mixed with "the softer" and "Mr. Grant". "There are" is a feeble introductive. I suggest:

"The breaking of the ore is by no means easy, because the softer material is crossed by hard streaks as F. E. Grant, the superintendent, informs me."

It is inadvisable to begin a principal sentence or a paragraph with 'and'; if required, the 'and' indicates that the sentence it introduces should be joined to the preceding sentence or paragraph. For example:

And this earlier religion seems to have cherished very genuine virtues, [to] which the religious orders, Jesuits, Dominicans, and Franciscans, bear eloquent testimony to.

Place subordinate words in less emphatic positions, leaving the important words where they are clear and disentangled from other words that clog them. Avoid emphasis on words that do not "deserve distinction". Monosyllables usually make a feeble ending for a sentence. Lord Shaftesbury, in his 'Advice to an Author', says: "If, whilst they [writers] profess only to please, they secretly advise, and give instruction, they may now, perhaps as well as formerly, be esteemed, with justice, the best and most honorable among authors".

That is a complex sentence so well arranged as to be per-

fectly clear, although marred by an excess of commas. Here is an example of well-knit prose, from Sir Martin Conway's 'The Crowd in Peace and War':

A great deal of art may be employed by the managers of a public assembly to induce, in the people present, the kind of sudden overwhelming enthusiasm of which large bodies of men are capable, such enthusiasm, however created, being afterwards a valuable asset to a movement, and often, as we shall hereafter see, leaving permanent traces upon the individuals who are affected by it.

Adverbs are commonly misplaced. Put the modifying word as near as possible to the word that it modifies. "The ore should properly be dried" does not mean that "the ore should be dried properly". The first refers to the need of a particular operation, the other to the need of conducting the operation in a particular way. "The words and groups of words that are near to one another in thought should be near in expression, and those that are separate in thought should be separate in expression." *

Such errors are frequent in the writings even of good authors.

The "even" should follow "frequent".

A geologist writes:

The actual purpose of his work is the supplying of **cheap** information.

He means "to supply information cheaply".

I purchased four pumps [each] of 1000 gallons capacity **each**.

His exordium would have been admirable if **he only** had spoken; but Mr. Asquith's significant reference to future relations aroused speculation instead of stilling it.

'Only' should precede 'he'; the writer means that it would have been better for the purpose if Mr. Lloyd George had been the only speaker. As it is, the sentence expresses the wish that he had spoken.

Here I venture to quote from Mr. Asquith's eulogy of Percy Illingworth. He was speaking in the House of Commons.

of the operations; he would supply the money, and that would limit his part in the venture.

(5) He agreed to find the money **only** for my first venture in mining.

That is, he undertook to back my first venture, but not any subsequent venture.

(6) He agreed to find the money for my first venture in mining **only**.

That is, he did not agree to back any venture of mine in farming, ship-building, or any business other than mining.

The wrong placing of adverbs is exemplified further by the following quotations:

They gave information to an extent not elsewhere known in the mining world.

"Elsewhere" should follow "known".

All this ravage was no mere incident or accident of war. It was deliberately planned and remorselessly carried out, and the motive and intent were not concealed. Germany intended hopelessly to cripple France economically. She wished brutally to destroy an industrial competitor . . . And the purpose was openly avowed.

I suggest:

"It was planned deliberately and carried out remorselessly, with a motive and intent that were not concealed. Germany intended to cripple the economic strength of France hopelessly. She wished brutally to destroy an industrial competitor . . . And the purpose was avowed openly."

"It is necessary to *always* roast the ore before chlorination" and "It is necessary to roast the ore *always* before chlorination" are both objectionable. In the first, "always" splits the infinitive; in the second, it qualifies the wrong word. The sentence should read: "Before chlorination, it is necessary always to roast the ore". This introduces "chlorination" ahead of "roasting" and is preferable to "It is necessary *always* to roast the ore before chlorination", because the necessity for roasting arises from the use of chlorination; therefore the ideas should

be expressed in that order. As a grammarian would say, "Before chlorination" is the antecedent phrase, and "it is necessary" is the consequent phrase.

Fully 40% of the coke **still** is made in beehive ovens.

The "still" refers to the "40%", and therefore should be placed nearer to it. 'Still' means 'constantly' or 'habitually'. It is not the right word in this context. He means 'even now' or 'to this day'.

"Even today 40% of the coke is made in beehive ovens."

The knowledge of **other** kinds of life than human life . . .

The "other" should precede "than".

Stringers which can be used as skids **later on** . . .

The "later on" modifies "used", and should be nearer to it. He means:

"Stringers that later can be used as skids . . ."

Do not bring two verbs belonging to different clauses into close contact, as in the following quotation from the 'New Republic':

What the more serious evils of that policy **are was** revealed by the election.

Their demonstration that the Atlantic **would be crossed was completed** when one of the three naval planes **starting** arrived at the Azores.

He means that of the three airplanes that started from the United States only one had arrived at the Azores, the other two coming to grief during the voyage across. Delete "starting". The jumble of the two verbs "would be crossed" and "was completed" is even worse. I suggest:

"The arrival of one of the three naval planes was sufficient to prove that the Atlantic could be crossed."

Avoid splitting the infinitive. I quote the following example from a mining report:

To better **mix** the ores delivering to the concentrating mill, the 36-inch distributing belt-conveyor was altered to automatically **traverse** the length of the ore-bin.

This is ugly, is it not? The engineer might have written:

"To produce a better distribution and mixing of the ore that it delivered to the concentrating mill, the 36-inch belt-conveyor was moved so as to traverse the length of the bin."

Objection to the split infinitive is supposed by some to be the mark of pedantry, and many are the jocose attempts that have been made to belittle such objection. Even so competent an authority as Lounsbury has failed in attempting * to justify the split infinitive, despite a labored effort to do so by quoting lines from poets who employed it to help their rhythm, or by citing the aberrancies of sundry masters of prose as an evidence of good usage. Not that the splitting of the infinitive is always avoidable, or always objectionable in the same degree. To insist upon the observance of rigid rules in the use of so flexible an instrument as language is foolish. The method of Procrustes is intolerable. I agree that we should not permit pedantry "to stiffen the natural graces of composition and weave fetters about the free movements of human thought".† Nevertheless I venture to deprecate the use of the split infinitive as an ugly locution, and one therefore to be avoided whenever possible. Sometimes it is employed with the idea of giving strength to a statement, this effect being supposed to be obtained by placing the adverb between the verb and the sign of the infinitive, thus:

He hoped to soon increase the output.

It was necessary to partly fill the tank.

You are urged to promptly notify the Police Department.

They failed to fully understand the condition of affairs.

Such splits are unnecessary and ugly, but I do not say that they are unpardonable. One might almost concede the ques-

* 'The Standard of Usage in English', by Thomas R. Lounsbury.

† De Quincey.

tion to be a matter of taste. Mine is averse from the usage, and I find that the authors whose style I admire do not split their infinitives. They have a feeling for language that deters them from such awkward dismemberments. Therefore I venture to give you the advice to abstain from the habit—for a habit it becomes only too easily. The question arises, how to avoid this locution. I suggest that it can be circumvented, for example, in the foregoing quotations, thus:

“He hoped soon to increase the output.”

“It was necessary to fill part of the tank.”

“You are urged to be prompt in notifying the Police Department.”

“They failed to appreciate the true condition of affairs.”

Other substitutes may be preferable, according to the context.

Another misuse of the infinitive is the omission of the ‘to’ when verbs are used in this mood. Thus Mr. George Harvey, Ambassador to the Court of St. James, says:

So we came along toward the end [of the War] and **helped** you and your Allies **shorten** the war.

He omits the ‘to’ before “shorten”.

Mr. Vernon Kellogg, in the ‘Atlantic Monthly’, writes:

The biologist . . . will start nothing to **help put** an end to war.

The ‘to’ is omitted before “put”. He might have written, “to help in putting an end to war”.

The same writer in the same magazine writes:

The great importance of these coliths to the student of early man is that, if they are really man-made, they **help substantiate** the evidence of Pithecanthropus and the Heidelberg Jew as to man’s probable origin in Pliocene time, or even earlier.

He might have written that the evidences “serve to substantiate”.

It is to be noted however that the auxiliary verbs take the infinitive, that is, the form without to. So also, according to

Sweet * do most of the defective and analogous verbs, such as 'can', and 'must'; whereas 'dare' and 'need' take either the infinitive or the supine (the form with 'to'). 'Ought' has only the supine.

I dared him to do it
 He dared not enter the room
 You need not go home yet
 He needed to be brave
 He ought to go home

'Have' takes the supine only in the sense of must.

You will have to do it

The full verbs that do not call for a 'to' are mostly those of feeling and perception, such as 'feel', 'see', 'hear', and 'find'.

I felt my heart beat
 I saw him enter
 We heard them pass

But 'perceive' takes the supine:

I perceived him to be a man of honor.

Again, the 'to' is not required with such phrases as 'had better', and 'would rather':

I had better go home now
 He would rather die than do that

The supine is used after passive verbs, including even those which in the active take the infinitive:

He was heard to say . . .
 He was forced to descend

Fernald † gives a short list of verbs, besides the auxiliaries, that do not always require the 'to'; they are 'bid', 'dare', 'feel', 'hear', 'let', 'make', 'need', and 'see'. But this does not apply to the passive form. Thus, in the 'New Republic' I find:

Miss Amy Lowell plays solitaire and we are let look over her shoulder.

* 'A New English Grammar', by Henry Sweet, Oxford, 1898.

† 'English Grammar Simplified', by James G. Fernald, 1916.

This is bucolic. Indeed, the idiomatic omission of 'to' after the auxiliary verbs and a few others of an analogous character has misled many writers into the misuse of the infinitive, particularly with 'help'. I am aware that the use of 'help' followed by an object noun or pronoun and the bare infinitive is found now and then in good English writing and that it is an idiom of familiar speech, but it is not proper to dignified or deliberate discourse. Other examples follow:

To **help make up** [offset] the deficit in our supply of petroleum . . .

His aim was to **help keep** [assist in maintaining] peace with Mexico.

It was our forefathers who **helped** [to] **determine** the independence of America.

Arthur Brisbane writes:

We are ready to **help** Europe **stop** murdering and squandering.

When I found a similar error in 'The Weekly Review', I wrote to the author, Mr. Philip Brown, who had started an article thus:

Of all the knights who **helped redeem** the Holy Land from the Turks the Australian was, in some ways, the most picturesque and remarkable.

In my letter to Mr. Brown, I asked him if his use of this locution was inadvertent or if it was deliberate; and if the latter, would he please justify it. In reply he said that my criticism was "quite sound"; and added: "My only defence is that I try to be direct in expression and employ the most natural language. 'Helped in redeeming' frankly seems to me a circumlocution". It is open to question whether "helped redeem" would be "natural" to careful users of English; I think not.

A head-line in the 'Literary Digest' announced:

Sports that **Helped** Our Presidents **Make** History.

I wrote to the editor and received a reply from the 'Lexicographer', who stated that "head-line English is a law unto itself. Under no other circumstances would the editor of

'The Digest' or the undersigned sanction the omission of those little words that help to bind [he does not say 'help bind'] our thoughts together and enable us to form perfectly molded English sentences. It is sincerely to be hoped that in your book on 'Technical Writing' you will discourage such omissions". I do so herewith. The usage that has been criticized will not be defended by serious writers; it is merely an example of slovenliness.

Another ungainly trick is to separate a principal verb from its auxiliary.

The adventurers to whom the expansion of mining was in the past so largely due.

"The adventurers to whom was due so much of the expansion of mining in the past."

These cannot be precisely stated.

"These cannot be stated precisely."

Science has enabled the number of human beings capable of existing upon this earth to be indefinitely multiplied.

"Science has enabled the number of human beings upon this earth to be multiplied indefinitely."

This is unsatisfactory: a "number" is not "enabled" to do anything. I suggest:

"Science has increased enormously the number of human beings that can live on the earth."

The mill was recently fully equipped.

"Recently the mill was fully equipped."

Here we move one of the adverbs to the beginning of the sentence so that it does not compete with the other, but "fully" must remain, I think, because it is doing good duty, and the placing of an adverb at each end of the sentence would be awkward.

He had never in his life seen anything like it.

F. D. Maurice had as early as 1848 founded a college for women in Harley street, London.

"As early as 1848 F. D. Maurice had founded a college for women . . ."

The mine **was being** hopelessly and irretrievably **mismanaged**.

"The mine was being mismanaged, hopelessly and irretrievably."

He **had** always earnestly **desired** if at all possible to prevent his force from **being** repeatedly **disorganized** by strikes.

"It was always his earnest desire, if at all practicable, to save his force from the repeated disorganization caused by strikes."

I do not say that all ores **can be** more advantageously **treated** by the air-cells than by the agitating-machines.

"More advantageously" should follow "treated".

Nesfield says * that "an adverb is often placed between the auxiliary verb and the principal verb", and quotes as justifiable examples:

The wind **has** suddenly **risen**.

I **have** quite **understood** you.

None of these splits, not even his own, is necessary; why not write: "Occasionally the adverb is placed between . . ." The "often" does not mean "frequently", for it is evident that he considers the usage somewhat exceptional. Indeed, I venture to assert that whereas the splitting of the verb is common in conversation—is essentially colloquial—it is infrequent in good writing. As for the examples, I would change them thus:

"The wind has risen suddenly."

"I have understood you perfectly."

Professor Nesfield's next example is of an adverbial phrase, which, he says, follows the same rule:

We shall within the next few days **hear** what he intends to do.

* Op. cit. Page 188.

The sense, he suggests, would be "quite different" if we said:

"We shall hear what he intends to do within the next few days."

Certainly, this is a different statement; for the adverbial phrase is meant to modify "we shall hear", not "what he intends to do". However, is not the meaning made clear by placing the adverbial phrase at the beginning, thus:

"Within the next few days we shall hear what he intends to do."

Exceptions present themselves, of course; indeed, there are idioms of this kind that appear to be unassailable; for example:

He **was** greatly excited by the news.

He **was** fully cognizant of the facts.

The mine **was** never so well developed.

The machine **was** ill chosen for the purpose.

I **have** not seen him since Friday last.

Humane people **can** quite often fail to realize.

Even these smack of the colloquial; in truth, these splittings are not literary; they can be avoided in writing, and they are best avoided. This I say in speaking. When I revise this lecture I shall change the last clause to "and they should be avoided".

The next development of this trick of splitting verbs is to divide the auxiliary also:

The ore **has** never **been** so cheaply milled.

Thus "has been milled" is dismembered into three parts by the intrusion of the adverbs. This is wholly unnecessary.

"The ore never has been milled so cheaply."

The work **will** when completed **facilitate** the development of the region.

"The work when completed will facilitate . . ."

In the preface to Bryce's 'Modern Democracies' I find these examples of verb-splitting:

The term Democracy **has** in recent years **been** loosely used.

"In recent years the term 'democracy' has been used loosely."

Every generalization now made is only provisional, and will have to be someday qualified: every book that is written will before long be out of date.

"Every generalization now made is provisional, and some day will have to be qualified; before long every book that is written will be out of date."

The world has nevertheless made some advances since then.

"Nevertheless the world has made some advance since then."

The author's writing is colloquial; it is as loosely knit as conversation. Probably the text was dictated. It does not follow because a sagacious statesman adopts such awkward locutions that he should be imitated; it signifies merely that Lord Bryce did not study the technique of writing.

A similar error is that of interpolating words between the definite article and the noun, as in

The already deep shaft has been sunk another hundred feet.

He decided, in the altogether unlikely event of his failure, to leave the country.

These and other splits suspend the sense; they are foreign to the art of clear expression. Newspaper writers fall into the habit, probably because they write hurriedly. Thus:

We today find nothing peculiar in this.

The emphasis is on "today", which therefore should come first, instead of separating "we" from "find". It is curious that such splittings, of the infinitive and of other verb phrases, are usually employed for emphasis, which can be obtained much better by other locutions. Such suspensions are "ugly in form as they are awkward in sense".*

You will find it advantageous to place sundry adverbs,

* Allbutt, *Op. cit.* Page 82.

especially those of time or place, either at the end or at the beginning of a clause; emphasis is gained thereby. Thus you can say:

"Lately the quality of the ore has improved", or "The quality of the ore has improved lately". The first is preferable. Either is better than "The quality of the ore lately has improved".

We shall soon be treating 100 tons daily.

"Soon we shall be treating . . ."

The vein is faulted frequently along the upper level.

The significance of the statement suffers by the bad construction. "Frequently" carries the idea of time; he means "at many points". I suggest:

"Along the upper level the vein is faulted at many points."

The qualifying phrase, like the adverb, should be placed near the word or phrase that it qualifies.

On the other hand, the worker is not paid a proportionately higher wage, during prosperous times, out of which he can build a reserve fund.

The phrase "during prosperous times" should precede "the worker".

The industry will find when it resumes operations that serious inroads have been made.

The phrase introduced by "when" should follow "industry", then the verb "find" will not be separated unduly from the consequent clause, introduced by "that".

Small pieces of gold are affected much the same in moving water as coarse gold.

The qualifying phrase should be placed at the beginning of the statement.

Allbutt suggests that accepted idiom favors the placing of the adverb before the active, but after the passive, verb.

A class was being taught the elements of syntax, and the teacher was saying many of the things that I have been trying

to say. At the close, he asked his pupils to quote an example of their own to show that they had understood the lesson. No response came, until Tommy Jones signified that he was ready with an example. "Well, what is it?" asked the teacher. Tommy quoted from his favorite novel: "'Oh, hell!' said the Duchess, breaking silence for the first time that evening"!

Thus significant words are placed at either the beginning or the end of a sentence. Aim at correct emphasis, but do not carry the effort to the extent of cultivating a mannerism. My purpose, in analyzing the foregoing examples, is to suggest the undesirability of separating the parts of a verb by an adverb or an adverbial clause. It has become common to say:

It certainly is
I sure did

and it is just such vulgarisms as these that mislead the student into illiteracies from which he finds it hard to escape.

The habitual use of slang, including a decorative kind of profanity, is detrimental to the acquirement of skill in expressing ideas. Slang beggars the vocabulary; profanity ignores it. The word 'damned' has to stand for a host of adjectives, and things 'go to hell' in a thousand ways.

XV. PUNCTUATION

A knowledge of the principles of punctuation is essential to effective and intelligible writing, for the ease and pleasure of the reader, and even his understanding, may depend upon the choice and the placing of punctuation marks. To 'punctuate' is to mark with stops or points; the word comes from the medieval Latin *punctuare* (*punctuatus*), which in turn is derived from the Latin *punctum*, a point. The purpose of punctuation is to show the manner in which the writing is to be understood; to indicate the relations of the parts of a sentence and of one sentence to another. To some extent "it does for the eye what vocal stress does for the ear", but especially it marks logical relations. Some punctuation marks, such as those indicating admiration, exclamation, and interrogation, are rhetorical as well as grammatical, but most of the common ones are logical or grammatical. My discussion will be confined to grammatical punctuation in ordinary writing.

"The problem of punctuation in text matter", as George Sumney says,* "is to employ words, points, and paragraph breaks in such a way as to achieve at the same time clearness, proper distribution of emphasis, and the desired kind of movement." The criticism of the punctuation of a sentence or of a group of sentences is not final until the context, within the paragraph, is read. A paragraph is a sentence or a group of sentences forming an independent unit of the composition; it represents a unit of thought. A multiplicity of paragraphs produces a choppy effect; on the other hand, paragraphs of excessive length are tiresome, because the belaboring of one unit of thought wearies the reader. The aim should be to

* 'Modern Punctuation', p. 43.

achieve an agreeable diversity. Similarly, the short sentence is useful for emphasis and transition; the long one for qualification and suspension.

The different marks, or 'stops', represent different degrees of discontinuity. Herbert Spencer suggested that actual spaces, proportioned to the pauses required, be placed between the groups of sentences dealing with the successive ideas expressed in a single paragraph. The suggestion is attractive, but to mark the varying duration of mental pause between words, sentences, and paragraphs by means of blank spaces of graduated length would impose an excessive tax on the carefulness of compositors and proof-readers, not to mention authors, and would be impracticable.

In the 'Rules for Compositors and Readers' issued by the University Press of Oxford I find the following summary:

- A Period marks the end of a sentence.
- A Colon is at the transition point of a sentence.
- A Semicolon separates different statements.
- A Comma separates clauses, phrases, and particles.
- A Dash marks abruptness or irregularity.
- An Exclamation [point] marks surprise.
- An Interrogation [point] asks [marks] a question.
- An Apostrophe marks elisions or [the] possessive case.
- Quotation marks define quoted words.

THE COLON

Formerly, when long sentences were in vogue, it was customary to use the colon as a stop intermediate between the period (or 'full stop') and the semicolon, but the shortening of sentences has relieved the colon of this duty. As now used, the colon suggests a sequel; it serves to introduce a specific statement, an amplification, an example, or a quotation; for instance:

I will agree to this: You pay me \$1000 within a month . . . and I will give you a deed to the land.

He answered: " I cannot do that ".

The choice of a comma or a colon to introduce a quotation is determined by the importance or the length of the quotation; the colon is regarded as the more impressive introducer.

The colon is employed to indicate consequential statements, explanatory or equivalent; for example:

One thing is certain: he will not dare to return.

We know what he intends to do: resign from office.

THE SEMICOLON

The term 'semicolon' is now a misnomer, for this mark of punctuation is not a half-colon; rather, it is what its form indicates—a compromise between the period and the comma, the two marks of which it is constructed. Sentences grammatically independent but closely connected in sense are separated by semicolons, which may be aided by conjunctions if the sentences are long.

The notes on 'Byron's World' are intensely interesting to the student of that period; and Byron, more than almost any other English poet, needs studying in the light of his social surroundings.

Henley places his adjectives with the skill of a medieval captain ordering his line of battle; they have a fighting quality; they make his verse hit you in the face.

Semicolons are used instead of commas to separate parallel phrases, so as to distinguish the superior breaks in the sense from the inferior.

Of the true nature of our existence on this planet; of the origin of our being, and of the meaning and purpose of it; of what is life and what is death; and of the nature of the rule that is exerted over us, we really know nothing.

When the conjunction in a compound sentence is omitted, a semicolon is inserted.

He is not a mining engineer; he is a mine promoter.

Here 'but' or 'however' is omitted.

A semicolon is used before a conjunctive adverb that

introduces a clause. Such conjunctive adverbs are 'however', 'therefore', 'nevertheless', 'accordingly', 'moreover', 'thus', 'then', 'so', and 'consequently'.

The room was full of smoke; therefore I came away.

THE DASH

The dash is used for several purposes—for example, to indicate a break in the construction, whether intentional or not.

To cram a lad's mind with infinite names of things that he never handled, places that he never saw or will see, statements of fact that he cannot understand and that must remain merely words to him—that, in my opinion, is like loading his stomach with marbles.

Also to indicate a pause of suspense.

Germany staked her all to win the hegemony of the earth—and lost.

To insert a passage that is not grammatically essential: for parenthesis.

All of them—Spaniard, Negro, Indian, Chinaman, and European—worked together energetically.

He lost his temper—a thing he had never done before.

Dashes are used freely by the careless and the slothful, who do not take pains to make them unnecessary.

The average residue contains less than one-half of one-ten-thousandth of 1%—0.000046%.

Instead of the dash I would suggest a semicolon followed by "it contains only".

The interpolation of sentences within sentences, set off by dashes, thereby breaking the sense, is undesirable—for example:

Two features may be emphasized: the comparative fineness of the grains that comprise the charge—it is not usually realized that an exceedingly fine but slime-free sand can be leached successfully—and the homogeneity of the mass.

The clause interjected between the dashes breaks the sense and leaves the last clause in the air; it deals with an entirely discrete idea, and should be separated thus:

"Two features may be emphasized: the homogeneity of the mass and the fineness of the grains that comprise the charge. It is not usually realized that an exceedingly fine but slime-free sand can be leached successfully."

'Fineness' is a matter of comparison; therefore "comparative" is redundant.

Another common error is to use the dash with the comma or the colon, making two marks perform the duty for which either is competent.

Dear Sir:—

Either a colon or a dash is correct. In addressing an editor, I suggest:

The Editor:

Sir—

THE PARENTHESIS

A phrase having no grammatical connection with the rest of the sentence calls for marks of parenthesis, often called 'curves'; if, however, the phrase is connected grammatically the curves are unnecessary.

It will be seen (Fig. 5) how the machine is constructed.

" Fig. 5 shows how the machine is constructed."

Short parentheses may be denoted by dashes, fore and aft; long explanatory interpolations are usually enclosed within curved lines, whereas explanatory additions to a quoted statement are enclosed within square brackets.

He remembered his mother—dead too now—who had protected him from his father's anger.

Those in this country who do stand for an expert specialism in education suffer, many of them (invaluable work though they have done) under the disadvantage of a merely prosaic and mechanical outlook.

A comma is needed before "under". The statement as a whole is badly phrased; I suggest:

"In this country many of those who stand for an expert specialism in education, despite the valuable work they have

done, suffer under the disadvantage of a merely prosaic and mechanical outlook."

He made a new machine (see accompanying illustration), and by aid of it remedied the chief defect of the original device.

If a parenthesis comes at the end of a clause or sentence, it must be followed—not preceded—by the requisite punctuation, because the parenthetical clause relates to what precedes it, not to what follows.

The ore came from the lowest level, (the 14th) which gave signs of an enrichment of the vein below the fault.

The comma after "level" should follow the second curve.

Sentences or clauses in parenthesis need no terminal punctuation of their own.

It was necessary to reduce the ore from 5 inches (as it came from the McCully gyratory crushers,) to half an inch (for delivery to the 54 by 20-in. high-speed rolls.)

Delete the comma after "crushers". The period after "rolls" should be outside the curve, because it is not needed where it is, whereas it is needed to mark the end of the sentence. The period after "20-in" signifies abbreviation and is correct.

The richest gold mines in Australia at that time were at Bendigo [in Victoria] and the richest silver mines at Broken Hill [in New South Wales].

Such additions or interpolations are inserted usually by the editor, or other commentator, to add necessary information that the author has failed to give. Similarly an editorial note at the end of a letter or article is placed within brackets. Generally speaking, interpolations of any kind disfigure writing, whether placed between dashes, commas, curves, or brackets.

QUOTATION MARKS

The marks of quotation are used to indicate the beginning and end of a passage that is quoted; they are also used to mark words that are quoted. Expressions that are common property,

such as proverbs or familiar phrases from the Bible or Shakespeare, do not require quotation marks.

A quotation should begin with a capital if it is long, but not if it is in direct serial order or is a consecutive part of the author's text. The quotation marks must be placed carefully, with proper regard for other marks of punctuation.

The editor asked a number of engineers "what is the matter with prospecting"?

Here the quotation mark after "prospecting" happens to belong to the question, and not to the statement as a whole; therefore it should be placed after the question mark, thus:

"The editor asked a number of engineers, 'What is the matter with prospecting?'"

As I use the double quotation marks for the amended example, I have to use the single inverted commas for the quotation within a quotation. This single 'quote' is employed for the titles of books and articles.

He read a paper on 'The Secondary Enrichment of Copper Ores'.

He quoted long passages from 'The Outline of History' by Wells.

The pairs of quotation marks should be used only to indicate matter quoted directly from a speaker or writer—*ipsissima verba*. The single 'quotes' are used also to indicate words that are unusual or are used in an unusual sense. Once such words have been so marked, it is not necessary to repeat the use of the single quotes when the words are repeated.

He spoke of the 'trust' as if it were an economic monster.

I infer that this mining venture is a 'wild-cat' and is intended to beguile the unwary.

The single quote is used also to mark words that are local or vulgar; as used thus it conveys apology or gives warning that the dictionary is being disregarded.

In Australia they 'fossick', whereas we prospect, for gold; so there the prospector is called a 'fossicker'.

The miners and the 'muckers' went on strike last Monday.

'Mucker' is a vulgarism for which there is no need; it means 'shoveler', so I use the single quotes as a mark of apology. In writing this explanation I have used 'shoveler', with single quotes, in order to mark it as an equivalent for the word 'mucker'. I prefer:

"The miners and so-called muckers went on strike last Monday."

If 'so-called' be used, the single quote is redundant, because 'so-called' performs the same function.

The plates of copper are hung by corrosion hooks in the acid.

One would infer that an error had been made, for what can "corrosion" have to do with "hooks"? The term refers to hooks that do not corrode, it is a trade name; therefore single quotes are required.

"The plates of copper in the acid are hung by 'corrosion' hooks."

He ordered some jackhamer drills from the Ingersoll-Rand Company.

"Jackhamer" is a variant of the technical term 'jackhammer'. The spelling is meant to be distinctive, like that of 'Unecda' and 'Prestolite', which likewise are trade names, or commercial nicknames.

Single quotes are used for the names of publications and of ships.

He sent me a copy of the 'New York Times' just as I was sailing on the 'Mauretania'.

The relation of quotes to other marks of punctuation is a matter of which a clear understanding is needed. When an extract is quoted in its entirety, as a separate paragraph, it is customary to place the quotation marks, fore and aft, entirely outside the extract; but there is difference of opinion as to the placing of the quotation marks at the end of a clause or sentence. The style-book of the Oxford University Press says:

"Some writers wish to exclude the comma or full point when it does not form part of the original extract, and to

include it when it does form part of it [the extract]; and this is doubtless correct."

This authority proceeds to say that "there seems to be no reason for perpetuating a bad practice", namely, that of placing the comma or period "within the quotation marks at the end of an extract, whether it forms part of the original extract or not". With this I concur heartily.

These ideas are illustrated by the manner in which the foregoing paragraph is punctuated. On the other hand, it will be argued by some that typographic appearance and preponderant practice are reasons enough for doing otherwise. If, however, the practice be illogical, it is well to break from it, as I have done, both as an editor and as a writer. It is customary for a writer to conform with the style of the publication to which he contributes, and it is usual for an author to accept the style of the publisher by whom his book is published, because to do otherwise would cause much confusion, which means extra trouble and expense. The style of most publishers, however, was founded in the composing-room, not the editorial office; it is the product of the mechanical, not the literary, department. The time was, not long ago, before the general use of the type-writing machine made it easy to obtain a clean copy of a manuscript, to leave such matters as spelling and punctuation to the compositors. The tradition lingers to the extent that most editors are willing to be relieved of the duty of punctuating the manuscript that comes to them, passing it on to the compositors and proof-readers, who are closely associated in the mechanical part of publication. According to an unreasoning convention, accepted by sundry publishers, it is correct to place the quotation marks outside the period even if the period belongs not to the quotation but to the statement as a whole, thus they write

He quoted Hancock's saying, "the tariff is a local issue."

It would be consistent with this style of illogical punctuation to place the second curve of a parenthesis inside the period at the end of a sentence, thus:

Shelley was making marvelous speed toward the highest truth if Browning is to be believed, and that devout Catholic Francis Thompson (whose essay on Shelley is one of the best, as Browning's is one of the worst, examples of English prose style.)

Obviously the last curve should be inside the period. In other respects also the punctuation is vile. A comma is needed after "truth"; an 'or' should replace the "and"; the comma before "and" is not needed, but one should follow "Catholic".

The same followers of an illogical convention, however, will place other marks of punctuation, notably the semicolon, inside the quotation marks—correctly, as it seems to me:

Whereupon I said, " I knew it long ago "; and he replied, " How did you find out?"

Why is the semicolon outside the quotation marks whereas in the next example, from the same context, the comma is inside?

He was a man of some distinction in the "old county," as the Cornish call it.

Here, by the way, I would use the single quote with 'old county', as nobody in particular is being quoted.

On another page of the same magazine I find:

That is not its "mighty effort"; that is not "the kernel in the nut."

Why is the semicolon outside, whereas the period is inside, the quotation mark? Because these matters are not given the consideration that they deserve.

My own suggestions concerning the use of quotation marks have been put into practice in print for many years, as also in postal correspondence. I submit them to engineers and other technical men, believing that they will find them helpful to clear writing. For further illustration I add the following examples of what I deem to be correct practice.

It is well to remember that "the tariff is a local issue".

We should not forget that "the tariff is a local issue", as Hancock said.

We remember that "the tariff is a local issue"; therefore we do not expect unanimity of opinion.

Similar reasoning applies to words within single quotes; thus:

Such illiteracies as 'preventative', 'suppositious', 'unpracticable', and 'up-raise' are common in mine reports.

The quotes are placed inside the commas because these punctuate the statement as a whole.

If a quotation appears within a quotation, the closing period may be placed logically outside the single quote but inside the double quotes; thus:

"The saying that 'a mine is a hole in the ground' is well enough, but I demur to Mark Twain's dictum that it is 'a hole in the ground owned by a liar'."

The period at the close of a quotation that forms part of a sentence belongs to the sentence as a whole, not to the quotation alone; therefore the closing quotation marks should be placed inside the period.

Macauley exclaimed, "The superlative is the mark of fools".

He replied, "I shall remember this always".

If the quotation is given separately it should be enclosed, fore and aft, within quotation marks. Huxley, criticizing Wilberforce, wrote:

"He devoted pages to the exposition of his conviction that Mr. Darwin's theory 'contradicts the revealed relation of the creation to its Creator' and is 'inconsistent with the fulness of his glory'."

In short, the marks of punctuation should be placed according to the sense, despite the introduction of quotation signs, which, manifestly, do *not* mark pauses in the diction, but are merely signs that the words so designated are those of another.

If the *ipsissima verba* are not given in a quotation it is misleading to use quotation marks. In quoting, however, it is not necessary to follow the punctuation except in controversial

matter. Changes of spelling and hyphenation are permissible, because uniformity of typographic style is necessary in the pages of a book or of any other publication.

THE COMMA

The comma is used or misused more often than any other mark of punctuation. It performs various functions:

(a) To separate the members of a series of co-ordinate words or phrases—that is, members of equal value:

Surface waters include those of swamps, brooks, rivers, and lakes.

(b) To separate the clauses in a compound sentence or to separate parallel clauses:

The panic-stricken garrison evacuated the fort, and the enemy entered it without a blow.

He said that the mine was comparatively young, that it was rich, that the ore was docile, and that the enterprise was full of promise.

(c) To separate elliptical sentences:

This is good; that, better.

Here the comma replaces 'is', but it would be preferable to say "that is better".

The claim on the hill was purchased for \$5000; the one in the valley for \$10,000.

Here the comma replaces "was purchased"; the pause after "valley" gives time to recall the previous verb without actually repeating it.

(d) To follow a clause out of its natural order—for example, a noun clause preceding the predicate:

That the mine is rich, I concede.

But no comma is required if the noun clause follows the predicate:

I concede that the mine is rich.

(e) To introduce a clause that is supplementary or explanatory, and therefore not essential to the sense:

The mine, which had been worked by the natives, was in disrepair.

But no comma should precede a restrictive clause:

The mine that he had examined proved to be worthless.

(f) To separate a dependent clause that precedes a principal clause:

Whatever may be the outcome of the Conference, it will awaken the world to the cost of preparedness for war.

(g) To indicate opposition:

Such operations are merely financial trickery, not mining.

(h) To set apart an introductory phrase in a sentence where without the comma there might be confusion:

To start with, it is obvious that . . .

In truth, he never even saw the mine.

(i) Participial phrases are set off by a comma, even if not introductory:

Smiling, he passed the cigars.

This being granted, let us proceed to examine the evidence.

This man, always willing to help, agreed to give us the benefit of his knowledge of the flotation process.

(j) To set apart words and phrases that logically should be thus isolated:

But, Sir, I beg to disclaim . . .

Smith, come here and give me a hand.

Get out, you lazy lubber.

(k) To set off a clause introduced by a conjunction, if the clause has its own subject nominative:

The ore is low-grade, but it is free-milling.

Here the second clause, introduced by "but", has a subject

nominative, "it". If the second clause has no subject nominative, a comma is not necessary:

The ore is low-grade but free-milling.

The omission of commas, as of other necessary punctuation, mars the sense:

To begin with all drawings should be made of standard size.

He does not mean "to begin with all drawings"; a comma is needed after "with", to separate the introductory phrase; otherwise "with" runs into "all". See rule (*h*).

He was a dealer in carbide and acetylene gas and latterly extended his activities to the supplying of all sorts of apparatus.

At first sight it would appear as if he were a dealer in "latterly extended" as well as in "carbide and acetylene gas". The sentence is compounded of two distinct clauses, which should be separated by placing a comma after "gas". See rule (*b*).

This was followed by a peremptory demand the justice of which was, questionable.

In reading, one would pause after "demand", and a comma would mark the pause. Moreover the clause following "demand" is supplementary and non-restrictive, therefore it should be introduced by a comma.

The reference to the elocutionary test suggests the advice that is frequently given to read aloud what you have written, because the varying pauses suggest the requisite marks of punctuation. However, writing that is meant primarily to be read aloud or to be spoken to an audience calls for a punctuation different from that which is required in the writing meant to meet the eye; in short, there are two kinds of punctuation, the grammatical and elocutionary. The punctuation that indicates the manner in which a passage is to be spoken, and marks such frequent pauses as are needed for an effective oral delivery, may obscure the grammatical relations of clauses and sentences.

Wilson gives * the following example, which he quotes from a book on elocution:

Men of superior genius; while they see the rest of mankind, painfully struggling, to comprehend obvious truths; glance, themselves, through the most remote consequences; like lightning, through a path, that cannot be traced; they see the beauties of nature, with light and warmth, and paint them forcibly, without effort; as the morning sun, does the scenes he rises upon; and, in several instances, communicate to objects, a morning freshness, and unaccountable lustre, that is not seen in the creations of nature. The poet, the statuary, the painter, have produced images, that left nature behind.

For the sole purpose of indicating the sense of the passage, it would be punctuated grammatically as follows:

“Men of superior genius, while they see the rest of mankind painfully struggling to comprehend obvious truths, glance themselves through the most remote consequences, like lightning through a path that cannot be traced. They see the beauties of nature with light and warmth, and paint them forcibly without effort, as the morning sun does the scenes he rises upon; and, in several instances, communicate to objects a morning freshness and unaccountable lustre that is not seen in the creations of nature. The poet, the statuary, the painter have produced images that left nature far behind.”

In my discussion of punctuation, I have restricted myself to grammatical punctuation, that is, to the punctuation needed in technical writing. However, I have thought it proper to make this digression for the purpose of passing reference to another phase of the subject, partly to indicate that it has not been ignored.

The drop in the price of silver has put an end to profits from the mine in Mexico, a fire had stopped production for several months before the silver market collapsed, when repairs had been made a drought had caused a shortage of electric power, and, of course, a further decrease of profitable activity.

* ‘A Treatise on Punctuation’, by John Wilson. This is an old textbook, especially honored in the composing-room and at the proof-reader’s desk.

This excerpt from a report is badly punctuated. After both "Mexico" and "collapsed" a semicolon is needed to mark the grammatical independence of the preceding clauses; the commas do not suffice. I suggest:

"The drop in the price of silver had put an end to any profit from the mine in Mexico; moreover a fire had stopped production for several months before the collapse of the silver market, and, after repairs had been made, a drought had caused a shortage of electric power."

Every Diesel engine must be set up and adjusted before it leaves the factory. This is entirely done away with in the Steinbecker engine, as its governing mechanism requires no adjustment, for with good workmanship and proper installation best results are assured with positive fuel regulation without previous testing. While running no readjustments of any kind are necessary as in the case of the Diesel.

This is a sample of the kind of writing usual in periodicals dealing with mechanical engineering. In that branch of the profession it is customary to use words as if they were crowbars, not chisels. In the above quotation, the introductory sentence is not open to criticism; it is a clear statement. "Done away with" is a miserable phrase. "With" is over-worked. A comma is needed after the participial phrase "while running", and another is needed between "necessary" and "as". I should re-write as follows:

"Every Diesel engine must be set up and adjusted before it leaves the factory. This precaution is not needed for the Steinbecker engine, which has a governing mechanism that requires no adjustment, so that, given good workmanship, proper installation, and positive regulation of fuel, it is possible to obtain the best results without any such previous testing. This engine requires no readjustment whatever while running, and in this respect also it differs favorably from the Diesel."

The placing of commas between co-ordinate words may make a confusing break in the structure of a sentence, thus:

Instead of the customary box a clean, tightly covered sheet-iron can is used.

Here the comma breaks a sentence at a point where there is no joint; that comes between "box" and "a", where one clause ends and the other begins. The effect, to the eye, of the comma is bewildering. I suggest:

"Instead of the customary wooden box, a clean and tightly covered sheet-iron can is used."

Or, better:

"A clean and tightly covered sheet-iron box is used instead of the customary wooden box."

Here is another example:

In spite of the low rate of disintegration of some of the radio elements old, unaltered minerals have reached equilibrium.

Again, the placing of a comma, quite properly, between two co-ordinate adjectives, produces a confusing effect. "Old" and "unaltered" are co-ordinate in their application to minerals; one cannot object to the comma on grammatical grounds; but it divides the sentence wrongly, because the first clause ends with "elements" and the second begins with "old". Therefore I suggest:

"In spite of the low rate of disintegration of some of the radio elements, old and unaltered minerals have reached equilibrium."

When mention is made of three or more members of a series, it is desirable to use a comma before the 'and' that links the last two. See rule (a).

Tom, Dick and Harry arrived last night.

The omission of the comma after "Dick" suggests that Tom is being addressed and that he is being informed about the arrival of the other two, or one might infer that Tom arrived alone, whereas Dick and Harry arrived in company. To take an example from technical writing:

This card system divides itself into several parts, namely, correspondence, technical information, catalogues and miscellaneous.

Apparently the card system has three divisions, one of which is "catalogues and miscellaneous". If, however, a comma precedes "and", the sentence will mean, as the writer intended, that there are four divisions, one of which is "catalogues" and another "miscellaneous".

To obviate excessive expense for power, stoping and hoisting must be done in the day-time.

Here "stopping" and "hoisting" are joined purposely in opposition to "power", as could *not* be inferred if the writer were in the habit of writing, for example, "Mining, milling and refining are the three main operations", omitting the comma after "milling". The omission of a comma after "stopping" is significant to those accustomed to write, "Mining, milling, and refining are the three main operations", using the comma before "and" to join the three members of a tripartite group.

This big problem of muscle, capital and brains, must receive the attention of thinking people.

It is a trio, not a duo. A comma is needed after "capital"; on the other hand, the comma after "brains" should be deleted.

Obvious as it would seem that to man ships, officers and men are necessary, it has been the habit of successive Congresses to ignore the fact.

This is borrowed from Sumney,* who says:

"'Ships, officers and men' is not a series". If we make it a rule to mark the three members of a series by separating each of them by commas, the meaning in such a context would be clear, as, for example, it was to me.

When commas are used to separate the members of a series, it is well to arrange the phrasing so that another comma does not precede or follow immediately, as in the following example:

Under the whip of war, with little but patriotic pride as an incentive, genius, initiative, resourcefulness, and other kindred latent qualities, were

* Op. cit., p. 22.

developed over-night, which being especially organized rendered irresistible the combined forces of the Allies.

The comma after "incentive" belongs there, though it may appear at first to join "incentive" to the series "genius, initiative, resourcefulness, and other kindred latent qualities". The comma after "qualities" should be omitted. The form of the sentence makes "over-night" the antecedent of "which". I suggest:

"Under the whip of war, with patriotic pride as the main incentive, the genius, initiative, resourcefulness, and other kindred latent qualities of men were so developed and stimulated as to render irresistible the united efforts of the Allies."

Commas are used too freely, especially after adjectives, the result being a choppy style.

He pointed to a typical, Elisabethan mansion, which had belonged to his grandfather.

This cross-cut disclosed a mass of soft, oxidized ore, the existence of which had not been suspected.

The adjectives "typical" and "Elisabethan" in the first quotation, likewise "soft" and "oxidized" in the second, are not co-ordinate; they are not of equal rank. "Typical" is superimposed on the unit formed by the second adjective ("Elisabethan") and the noun ("mansion"). It is the "Elisabethan mansion" that is "typical", not "Elisabethan" alone. So also "soft" applies to the unit "oxidized ore". The comma should be omitted after "typical" and after "soft". The same reasoning holds good in such phrases as:

American electrical machinery
Heavy mineral oil
Solid cast-iron rollers
Friendly commercial relations

In these phrases no commas are needed, because the words after the first adjective in each phrase constitute a unit. On the other hand, if the adjectives are co-ordinate, each playing an equal part, then they should be separated by a comma:

Long, slender, tapering cones
Deep, narrow, dark defiles
Stupid, malicious, unprovoked diatribe

A few more examples may prove useful:

The parsons are here with their quaint, hieratic language, nearer to essential truth than our economists.

The writer means that the "hieratic language" is quaint; the two adjectives are not co-ordinate. The omission of the needless comma renders more obvious the break indicated by the necessary comma, after "language".

The immigrant is in origin a peasant, inarticulate, and underneath by habit and tradition.

The comma after "inarticulate" is objectionable. The writer means that "the immigrant is in origin a peasant, inarticulate and underneath by habit and tradition". He is inarticulate "by habit and tradition" no less than he is "underneath" from the same causes.

The standard raise is a regular six-post, two-compartment combination of chute and manway.

The adjective "regular" applies to the entire phrase that follows; therefore the comma after "six-post" is not required; it breaks the continuity of thought.

The placing of commas before and after such adverbs as 'apparently', 'occasionally', 'therefore', 'then', 'evidently', and 'fortunately' is stilted and awkward, because it turns such words into a parenthesis—in most instances needlessly; for example:

He, therefore, decided to return.

They were unfriendly and, apparently, were unwilling to assist.

These circumstances, evidently, were more influential than he had supposed.

The rise in copper was a detail that, fortunately, he had anticipated.

THE PERIOD

The period is the most frequently used punctuation mark except the comma, and it outweighs every other point. It is emphatic but not suspensive.

Abbreviations are indicated by the period:

Pro. tem. 6 in. 8 ft. gal. B. A. U. S. A. Calif. Penn.

Also contractions:

i. e. (id est = that is)

e. g. (exempli gratia = for the sake of example)

etc. (et cetera = and the rest)

viz. (videlicet = to wit)

A series of periods, usually three, indicates the omission of words:

They propose that the building shall belong . . . to the communes in which they stand.

These are secondary uses of the period, its chief function being to mark the completion of a sentence; therefore in many respects it is the most important of all the marks of punctuation; indeed, some writers depend upon it almost entirely to regulate their flow of language, dispensing with the colon and semicolon, and even using the comma sparingly. Victor Hugo and some of his imitators treat so many of their sentences as paragraphs that their style becomes spasmodic and tiresome. Our American newspaper writing tends to this extreme. As a step toward simplification such a style is commendable, but it is easily overdone. To the reader such 'snappy' writing seems at first to be clear and vigorous; then the fresh starts become monotonous in their iterative impact on the brain; before the end, if the article is fairly long, the manner becomes so unpleasant that the reader's annoyance overwhelms all other impressions. British press-writers, after the fashion of Macaulay and Edwin Arnold, are inclined to the other extreme; they indulge in well-rounded sentences varied by interjectory phrases and

subordinate clauses, and produce a literary style that in the hands of the less expert readily becomes rambling or involved. Obviously it is desirable to avoid both extremes. REMEMBER THE READER. Observance of this basic principle will guide the writer to a proper mean in the use of the period, as of other marks of punctuation, so that the reader will be saved the mental effort on the one hand of jumping a series of hurdles, as it were, and on the other hand of losing his way in a maze. Here are two examples of the jerky style:

Allies must have common sentiments, a common policy, common interests. Russia's disposition is aggressive. Her policy is the closed door. Her interests lie in monopoly. With our country it is precisely the opposite. Japan may conquer, but she will not aggress. Russia may be defeated, but she will not abandon her aggression. With such a country an alliance is beyond the conception even of a dream.

The foregoing is taken from the London 'Times' as quoted in 'The King's English'. Here is one from a Kansas newspaper:

Writing a column is a fine job. It is composed in about equal parts of labor, work, and worry. A column hound toils and slaves to get out his column and then worries his head off for fear he'll go stale and lose his job. All that is expected of a column hound is that he be amusing or clever in twenty-five or thirty different ways every day. A vaudeville performer can go out with one act and get it booked for forty weeks solid. The next year he can go over the same circuit with the same act. The people forget what he said last year and laugh their heads off at his stuff. So long as he busts somebody over the head with something or sticks his fingers in somebody's eye the audience will howl with laughter. It doesn't make any difference how many times the audience has seen him do it. Busting somebody over the head is laughter's principal accessory.

A column hound must have a new act every day. If he busts anybody over the head or jabs his finger in anybody's eye he gets the paper into trouble. Most anything is funny on the stage. Very few things are funny in print. Cold print reveals a man at about life-size. If you don't believe it go out and listen to a speech by your favorite rabble-rouser and then try to read it in cold print. One trouble with a column hound is that when the stuff doesn't flow freely he becomes desperate and tries to force it. The saddest thing . . .

I forbear from quoting further; by this time my reader will imagine that he has been "busted over the head or that some-

body has stuck a finger in his eye". On the other hand, consider a paragraph such as the following, quoted from Milton:

I must say, therefore, that after I had from my first years, by the ceaseless diligence and care of my father (whom God recompense!) been exercised to the tongues, and some sciences, as my age would suffer, by sundry masters and teachers, both at home and at the schools, it was found that whether aught was imposed by them that had the overlooking, or betaken to of mine own choice in English, or other tongue, prosing or versing, but chiefly this latter, the style by certain vital signs it had, was likely to live.

This paragraph is constructed correctly, but it is much too complicated for pleasant reading or ready understanding. The writing of Woodrow Wilson errs similarly; for example, in the 'Delineator' of November 1909, he wrote:

In the professional schools of an ideal university nothing of this practical spirit would be abated, for such schools are, one and all, intensely and immediately practical in their objects and must have practice always in mind if they would be truly serviceable; but there would always lie back of their work, by close association with the studies of the university in pure science and in all the great subjects which underlie law and theology, the impulse and the informing spirit of disinterested inquiry, of study which has no utilitarian object, but seeks only the truth. The spirit of graduate study, and of under-graduate, too, would be carried over into all professional work, and engineers, doctors, ministers, lawyers, would all alike be made, first of all citizens of the modern intellectual and social world—first of all, university men, with a broad outlook on the various knowledge of the world, and then expert in a great practical profession, which they would understand all the better because they had first been grounded in science and in the other great bodies of knowledge which are the foundations of all practice. That is the service the university owes the professional schools associated with it. The parts should be vitally united from end to end.

It is supposed that more punctuation is required in scientific writing than is customary in ordinary writing, but this idea seems hardly in accord with the fact that the lawyer in his technical writing aims to use punctuation marks as little as possible, because he knows that they may cause misunder-

standing if placed wrongly. That is why, it may be assumed, Acts of Parliament contain no marks of punctuation. The statutes of Congress, however, are punctuated, and on their punctuation more than one lawsuit has been based, despite the custom of the courts to disregard punctuation wherever the sense is clear. For example, one judicial opinion * states that "although it has been held that punctuation may be disregarded, it may be resorted to as an aid in construction when it tends to throw light on the meaning". Another † says: "Punctuation is a most fallible standard by which to interpret a writing. It may be resorted to when other means fail; but the Court will first take the instrument by the four corners in order to ascertain its true meaning. If that is apparent on judicially inspecting it, the punctuation will not be suffered to change it".

To which one may remark that the omission of the necessary punctuation marks is just as likely to cause misunderstanding as the use of too many of them. However, the experience of the law suggests that a statement if made in logical form will convey its meaning correctly with the aid of the minimum of punctuation; the argument seems to be that the use of punctuation, except the placing of periods at the end of sentences, signifies an effort to correct defects in our writing. If we used fewer stops, we might write more clearly. A faulty sentence should not be corrected by a remedial punctuation; it should be re-written. A great number of stops is a sure sign of bad phrasing:

Shakespeare, it is true, had, as I have said, as respects England, the privilege which only first-comers enjoy.

This is quoted from Lowell by the Messrs. Fowler in 'The King's English' as "a good example of the warning value of commas". In the example cited they are needed, and thereby

* *Commonwealth v. Kelley*, 177 Mass. 222.

† *Ewing v. Burnet*, 11 Peters 41; U. S. Supreme Court, 1837.

they suggest the defectiveness of the construction, which is "like an obstacle race".

The miners, it was anticipated, would refuse, unless the rate of pay was raised, to return to their work, which, it will be remembered, they had left without any warning to the company, early in January.

This is an example of a choppy style, marked by numerous short phrases that require commas, most of which could be spared if the phrasing were better. I suggest:

"It was anticipated that the miners would refuse to return to work unless their rate of pay was raised, for it will be remembered that early in January they had left without any warning to the company."

The great exemplar of statements that are long but orderly, complex but clear, is Ruskin. I quote his poetic description of the micaceous rock that forms the crest of the Matterhorn.

They are, on the contrary, an unaltered monument, seemingly sculptured long ago, the huge walls retaining yet the forms into which they were first engraven, and standing like an Egyptian temple,—delicate-fronted, softly colored, the suns of uncounted ages rising and falling upon it continually, but still casting the same line of shadows from east to west, still, century after century, touching the same purple stains on the lotus pillars; while the desert sand ebbs and flows about their feet, as those autumn leaves of rock lie heaped and weak about the base of the Cervin.

Is not this a strange type, in the very heart and height of the mysterious Alps—these wrinkled hills in their snowy, cold, grey-haired old age, at first so silent, then, as we keep quiet at their feet, muttering and whispering to us garrulously, in broken and dreaming fits, as it were, about their childhood—is it not a strange type of the things which "out of weakness are made strong?" If one of those little flakes of mica-sand, hurried in tremulous spangling along the bottom of the ancient river, too light to sink, too faint to float, almost too small for sight, could have had a mind given to it as it was at last borne down with its kindred dust into the abysses of the stream, and laid, (would it not have thought?) for a hopeless eternity, in the dark ooze, the most despised, forgotten, and feeble of all earth's atoms; incapable of any use or change; not fit, down there in the diluvial darkness, so much as to help an earth-wasp to build its nest, or feed the first fibre of a lichen;—what would it have thought, had it been told that one day, knitted into a strength as of imperishable iron, rustless by the air, infusible by the flame, out of the substance of it, with its fellows,

the axe of God should hew that Alpine tower; that against *it*—poor, helpless mica flake!—the wild north winds should rage in vain; beneath *it*—low-fallen mica flake!—the snowy hills should lie bowed like flocks of sheep, and the kingdoms of the earth fade away in unregarded blue; and around it—weak, wave-drifted mica flake!—the great war of the firmament should burst in thunder, and yet stir it not; and the fiery arrows and angry meteors of the night fall blunted back from it into the air; and all the stars in the clear heaven should light, one by one as they rose, new cressets upon the points of snow that fringed its abiding-place on the imperishable spire?

In this exquisite passage the many beautiful ideas are interwoven without breaking the main thread of thought; the words and the punctuation combine to create a masterpiece; nevertheless I dare to suggest sundry minor changes in the punctuation.

The comma after "Egyptian temple" is not needed, because the dash suffices. The question mark after "made strong" should follow the quotation mark. After "lichen" the semicolon is not needed, as the dash marks the sudden transition from description to question. The use of the dash with the exclamation mark after "helpless mica flake" is an example of one of the rare places where two points seem justifiable. A second "should" would be proper after "kingdom of the earth"; and another after "meteors of the night". Probably Ruskin felt that he had used "should" so many times that it might be taken for granted, and thereby avoid an excess of repetition.

The question arises to what extent Ruskin's punctuation of his own text was followed by the man that set it in type or by the proof-reader that revised the galleys. It is more than probable that another edition of 'Modern Painters' would show differences in the punctuation of this splendid passage. The fact must be faced that punctuation, like spelling, is a matter that editors have been in the habit of leaving to the typesetter and the proof-reader, the latter being recruited not uncommonly from the composing-room. One result, among others, is that some usages are merely conventional; they

are not based on logical reasoning—for instance, the placing of the period inside quotation marks when these marks refer only to a word or to a minor part of the sentence, thus:

Again and again he harped on that word "reciprocity."

There is no logic in placing the 'quotes' outside the period, which marks the close of the sentence as a unit.

Another illogical custom, to be noted in magazines with high literary pretensions, is to use the comma and the dash concurrently in places where one of these marks of punctuation suffices.

When it was obvious to me that even the American flag would not save me,—that, on the contrary, it would attract attention to us,—I accepted the proposal with thanks.

This is quoted from the 'Atlantic Monthly'.

Some of my suggestions, particularly in regard to the placing of quotation marks, are opposed to the prevalent custom, but that need not prevent technical writers from adopting these suggestions in their correspondence and reports. They will find, when they write for a magazine or a newspaper, that their style of punctuation will be made to conform with that of the publication to which they send their letter or article; and if they write a book they will find themselves called upon to conform with the style of their publisher. Manifestly a newspaper or magazine must print its matter in uniform style as regards spelling and punctuation, and, in most instances, the writer will be the more docile for the reason that he has no decided ideas of his own concerning these minor matters. Nevertheless punctuation is not a minor matter to one who desires to acquire the art of writing clearly and convincingly, so I have not failed to give space to it in this book. In course of time the editor will assert his control in this matter, and to exert that control intelligently he will take a keener interest in punctuation. When that consummation is achieved we may expect some measure of real improvement.

Such passages as I have quoted, whether for warning or

ample, show that punctuation distributes the weight of ought among the different parts of the literary structure; affects the emphasis of the subordinate elements; above everything, it regulates the movement that marks the progress the thought. As Sumney says: "An experienced writer plans a point as definitely as he means a word".

XVI. COMPOSITION

Do not write until you have something to say. Think first; then write. In order to be understood, you must know what you wish to say. Clear writing is the consequence of clear thinking. Therefore consider your subject well before you begin to write; ruminate on it; marshal the salient facts in your mind; saturate yourself with the ideas you wish to express and with cognate ideas; then express yourself deliberately. If you are bubbling over with your subject the words will come, but you might as well expect to sail without a breeze as hope to give life to words without the living thought.

Here I may advert to the fact that among the uneducated it is a common expectation to acquire the knack of writing without taking the trouble to study the art of writing. I overheard a woman in a suburban train remark to her neighbor: "I'd like to be able to write well without stopping to think about it". She was one of many who would like to do a thing well without the trouble of thinking; but it cannot be done in respect of anything to which thought is essential. The possession of a good voice does not justify a person in expecting to sing successfully to a large audience; before singing in public one has to master the technique of singing; one has to learn first how to breathe properly, how to enunciate, and many other things. The successful singer is an artist, not a megaphone. Most of us would regard a man or a woman without any training in the art of singing as a fool or an impostor if he or she were to give a public concert, yet we do not recognize the equal foolishness and imposture of persons that write books before they have studied the technique of writing. That is why so many books are unreadable, and why many books by clever men are difficult to read. They start to write books before

they have learned how to write; their style is colloquial, and exhibits the errors of ordinary conversation; it is marked by the inversions and obscurities frequent in the letters dictated by business-men; it does not fulfill its purpose, for the purpose of writing is to communicate ideas clearly, comfortably, and convincingly.

Stevenson said: "When truth flows from a man, fittingly clothed in style and without conscious effort, it is because the effort has been made and the work practically completed before he sat down to write".

Endeavor to visualize the things to be described; consider their relations to one another; let your mind dwell upon the particular phase of their relationship that is to be the subject of your writing. Then prepare an outline of the argument or of the successive stages of the description. Begin the writing with a general statement of the subject to be discussed. Try to strike a clear note; do your tuning where it will not annoy the reader. After making the general statement, proceed to details. Make them vivid; keep them distinct. Then draw your inferences and play upon them until they lead naturally to a definite conclusion, which should embody the purpose and purport of what you have written.

Before beginning to put your ideas in writing, charge your memory with the words, technical terms, and phrases that will furnish the means for effective expression. To acquire an adequate vocabulary, read what others, preferably good authors, have written on the subject or on a kindred subject. An artist is not expected to utter the message in his soul until he has mastered the technique of his instrument, neither can a writer be expected to express thought fluently and pleasantly without acquiring the technique of language.

Let Macaulay be your model. Professor Hill says of him: "What he saw at all he saw distinctly; what he believed he believed with his whole strength; he wrote on subjects with which he had long been familiar; and he made lucidity his primary object in composition. For him, in short, there was

no difficulty in securing clearness except that which is inherent in the nature of language. This difficulty he overcame with unusual success, as all his critics admit, and one of the severest of them, John Morley, says that he 'never wrote an obscure sentence in his life'".

Sentences are said to be of two kinds, the periodic and the loose; but this dictum serves only to illustrate the fallacy of dichotomous division, even though it have the authority of all the rhetorics to back it. The foregoing statement was constructed as an example of the so-called 'loose' composition, because the sense is not sustained unbroken to the end; it could have ended at an earlier pause. A periodic sentence is the product of an effort to pack neatly the items that it is to carry in such a way as to leave no loose ends. The foregoing sentence is 'periodic'—that is, it ends with the completion of its period. However, the terms 'periodic' and 'loose' are generally applied to longer and more complex sentences. All good sentences should show a careful ordering of their parts with a view to effective expression. To follow persistently one form of construction savors of affectation. Both forms have their charm when used by a master; both are used variously by every author. Model your style on Macaulay rather than on Meredith, on Stevenson rather than on Henry James.

Short sentences are easier to write and easier to understand than long ones. "The longer the sentence the more arduous its architecture."* The long sentence is difficult to manage, but it enables the writer to assemble a group of related ideas into a coherent whole and to make a complete unbroken impression. Variation in the length of sentences is essential to an agreeable style. Avoid an excess of short asthmatic sentences; avoid also long sentences that are packed with a mass of unsorted and unrelated ideas.

A paragraph should be devoted to one main idea, and it should either begin by introducing the idea that it is intended to develop or its beginning should suggest the direction in which

* Allbutt.

the thought is to move. Here again Macaulay is a good exemplar; so is Ruskin. The end of the paragraph, or the last sentence, should complete the preceding thought and bring it to a definite conclusion. The thoughts expressed in the intermediate sentences, not too insistently, linked by well-chosen connectives, should pass by the easy transition of successive steps to the climax of a conclusion. "In Shakespeare one sentence begets the next naturally; the meaning is all inwoven. He goes on kindling like a meteor through the dark atmosphere."*

Technical writing is devoted largely to description and exposition. "Good arrangement is at least one-half exposition. Order is often equivalent to explanation." In describing a machine it is advisable to consider the parts in logical order, that is, in the order in which they are set in motion. In describing a mill the description should follow the flow-sheet. In explaining the origin of an ore deposit the physical processes and geologic movements supposed to have been at work in the making of it should be discussed in the sequence of their natural operation.

Comparison is indispensable in technical description. By references to similar things the reader is helped to understand the thing described. An ore deposit is elucidated by mentioning its points of similarity and dissimilarity as compared with other deposits likely to be known to the reader. Machines and processes are made intelligible by comparing them with those with which both the reader and the writer are familiar. Facts by themselves have little meaning; it is in their relation to other facts that we find their true significance.

The poor quality of much of the technical writing of today is due, I believe, to the intervention of the stenographer. Dictation tends to develop diffuseness and repetition. Many find it easier to use the mouth in talking than the hand in writing. That is why the average dictated letter, unless it be edited and re-written, is verbose. An author who uses pen

* Coleridge in 'Table Talk'.

or pencil can see what has gone before and can compose with a consecutiveness that is conspicuously rare in a dictated composition. Technical men accustomed to dictating their correspondence find it difficult to write an article in long-hand; so they dictate the article also; and the consequence is that the article resembles the dictated letter in failing to be closely knit, clear, or logical. Henry James is said to have dictated his later writings, and this may account in part for their involved style. My own practice is to write with a soft pencil on paper that is not too smooth. The dipping of a pen into the ink introduces an artificial interruption—annoying if it comes in the middle of a sentence. Besides, the point of the pen being hard, the fingers soon tire. The penciled manuscript is given to a typist, and the clean typewritten copy is then revised carefully before it goes to the composing-room. The first draft, the typewritten copy, the printer's proof, each in turn, represents a stage of increasing dignity in the development of an article. The earlier a correction is made the better. In former days many of the minor corrections, of spelling and punctuation, even of grammar, were made in the composing-room or in the printing-office. The real editors were the typesetters or the proof-readers. That practice, I am glad to say, is becoming obsolete.

Some writers find it convenient to jot down notes on separate cards or small sheets of paper, and then arrange them in orderly sequence. I advise you to try this method. Others, especially the more practised writers, dispense with such aids. As a rule, the beginner will be wise if he prepares an outline of what he intends to write, so as to give sequence and proportion to his treatment of the subject.

Clever men think more rapidly than they can write; stupid men write more rapidly than they can think; a good writer will form the habit of regulating the speed of his thinking so that it keeps step with the order of his writing. The ability to synchronize the operations of the brain and of the hand is acquired by experience, which, in time, engenders a habit As Ben

Jonson said: "The best writers in their beginnings imposed upon themselves care and industry; they did nothing rashly; they obtained first to write well, and then custom made it easy and a habit. By little and little their matter showed itself to them more plentifully; their words answered, their composition followed; and all, in a well-ordered family, presented itself in the place. So that the sum of all is, ready writing makes not good writing, but good writing brings on ready writing".

XVII. STYLE

Technology has no recognized rank in what is called polite literature; the subject-matter of engineering is not supposed to lend itself to artistic treatment; we are the hewers of wood and drawers of water to the high-priests of learning who live on the cold summit above our humbler dwellings. Therefore the hierophants smile at the notion of 'style'—"that curiously personal thing"—in technical writing. The "great art" of Pater, the "inevitable phrase" of Raleigh, the "note of distinction" that Arnold demanded are said to be beyond the scope, as they are supposed to be beside the need, of a writer on geology or engineering. This is a narrow view. Science, no less than *belles lettres*, calls for the best exercise of the human intelligence; the art of writing should be employed as skilfully and as earnestly in a description of the structure of the Sierra Nevada, or of the construction of a tunnel through the range, as in a rhapsody welcoming the rosy fingers of the dawn.

The idea still lingers that fine writing does not befit technology, even though the masters of the Victorian period—Huxley, Tyndall, Ruskin—proved that science is worthy to be arrayed in the best robes that the looms of thought can weave. At the beginning of these lectures I quoted Barrie's remark touching the inability of the scientific man to express himself. That imputation has been passed to the technologist, whose utilitarian pursuits are supposed to make him too clumsy for the refinements of human speech. We may not have acquired the self-consciousness of those writers on Art whose "power of expression is so cultivated that their sensual caterwauling may be almost mistaken for the music of the spheres"; nor can we imitate the politicians, who have the ability to speak far beyond anything that they may have to say; but we too have a litera-

ture—a literature that is a gold mine of human experience—and we have a conscious aim to use our great inheritance, the English language, in furthering our purpose. Therefore, I submit, we are justified in discussing a matter even so recondite as ‘style’.*

The engineer joins the essayist, the historian, and the poet in bowing to the greatest of all definitions of style: Buffon’s “*Le style est l’homme même*”—style is the man himself. Good writing is natural; great writing is sincere. Artificial rules can no more furnish style than a man “by taking thought can add one cubit unto his stature”. Not long ago I had the pleasure of editing an article on the discovery of cyanidation contributed by one of the originators of that process. The article was written without affectation, with a directness and a charm characteristic of the author of it. A correspondent in Australia wrote saying: “The charm of which you speak is characteristic of all good writing, whether on familiar or professional subjects. One might also conclude that such qualities of sincerity and kindliness alone can account for literary excellence”. The persons concerned in this story are not famous—it was not Tyrrell talking to Carlyle about Swift, for example—but the episode serves to explain Buffon’s saying “Style is the man himself”. Buffon also said, “Ideas alone are the foundation of style”, and Stevenson left a saying that is worth many rules: “If a man can group his ideas, he is a good writer”. Without the ideas to bind his assorted facts, the writer fares no better than the Israelites in Egypt when they were expected to make bricks without straw. Given the ideas, the next step is to group them so as to achieve that “perfect lucidity” which Carlyle imputed to Swift. Then comes the

* “The word ‘style’ is derived from the instrument (*stilus*) of metal, wood, or ivory, by means of which, in classic times, letters and words were imprinted on waxen tablets. By the transition of thought known as metonymy the word has been transferred from the object which makes the impression to the sentences which are impressed by it, and a mechanical observation has become an intellectual conception.” Gosse in ‘*Encyclopædia Britannica*’.

search for the fitting word—"le mot propre" of Flaubert—the word that belongs to the thing described, the precise epithet. This was one of Shakespeare's great gifts. So, working backward, we have the proper word, the word in its right place, the idea that gives life to a sequence of words, and, behind all, the soul of a man.

That reminds me of Abraham Lincoln, whose style was indeed "the man himself". To his basic sincerity a fine tribute has been paid in a recent criticism by Harry Thurston Peck:

"Lincoln's style, both in the sphere of oratory and in the sphere of dialectic, exhibits two distinct and very striking characteristics. The first is a remarkable compactness, clarity, and precision of statement, which may be taken as a nearly faultless model of convincing exposition. These qualities, moreover, derive their ultimate effectiveness from the supreme perfection with which they show the intellectual processes that gave them birth. The dominant thought is stripped of every superfluous detail and made to stand out vividly before the mind in a clear white brilliancy of phrasing; a nervous energy that is muscular and full of force brings every word to bear upon the writer's purpose; while a delicate balancing of contrasted thought is conveyed in an equally delicate balancing of phrase, that pleases and attracts the mind, no less than the ear, of him who hears it. A tendency toward veiled antithesis, indeed, may be set down as a definite feature of Lincoln's oratory. It enters into nearly all of his most finished utterances; and it is the more effective in that it does not spring from conscious artifice, but is entirely natural; for it arose from the supremely logical workings of an intellect that had been trained to see the other side of every question, to set one fact against another, to weigh and to compare, and then to render judgment with a perfect impartiality. This it was that gave to Lincoln's controversial oratory its great persuasive power; for it struck the note of absolute sincerity and of intense conviction."

You may have heard of the author that was obsessed by an unattainable ideal of style. James Huneker tells us that he

dreamed of "long sweeping phrases, drumming with melody, cadences like the humming of slow uplifting walls of water tumbling on sullen strands". Do not permit yourself to entertain such an idea; it is not within the province of the technical writer, and will lead only to insincerity. Sincerity is the keynote of good writing. Those "lines of chiseled beauty" will come if you attend to the fundamentals and abstain from rhapsody. Anything like a personal or distinctive style cannot be acquired until you have trained yourself to control the gift of expression.

This advice on 'style' may seem premature; it may be like some other "road-maps to Parnassus that are useful only after you have got half-way up"; but I repeat: be natural; be yourself; shun artifice; avoid affectation; say frankly what you know or what you have observed; use only words the meaning of which you know; avoid purple patches and rhetorical confectionery. In time you will learn, as the subjects of Queen Anne learned in their youth from Pope's 'Essay on Criticism' that the words should move slowly "when Ajax strives some rock's vast weight to throw", but that they should quicken when swift Camilla "flies o'er the unbending grass or skims along the main". Group the composition about the central idea. Be satisfied with short sentences until you have gained the experience that enables you to swing the longer ones dextrously. As you gain experience, vary the length of your sentences; the crisp sentence is a relief; the long and resonant period is delightful. Make the thought consecutive and place the sentences in such order that the succession of ideas leads naturally to a definite conclusion.

Not all engineers are graduates of a university, and many of those who have been so fortunate as to receive a liberal education are not well trained in the use of their own language; they have not had such a training as is founded upon a knowledge of the languages of antiquity, supplemented by careful reading of the English classics. To appreciate good writing keenly is a stimulus to developing one's own style. Such

preparation is valuable, but it is not essential to the ordinary technical writer, provided he makes the most of his schooling and tries sincerely to avail himself of the means of expression at his command. University education rarely succeeds in producing men that write succinctly; intelligence and care—which is the supreme mark of intelligence—can accomplish great things.

Two examples will illustrate my argument. Several years ago I had to edit a long and detailed description of a metallurgical device and the operation of it. The article was eminently practical and businesslike. The subject did not permit any literary pose, yet the article evidently was the work of a capable craftsman. I found that it needed scarcely any editing, and when it was published I referred gratefully to the excellence of the writing. Happening to discuss the incident with a friend, I was asked by him to guess for what occupation the writer had been trained, and I said: "The ministry". This guess happened to be right, for the writer had studied at Oxford and was intended for the Church before he wandered into a cyanide mill. The article bore the marks of the writer's training: a quiet command of English and a masterful use of it, making a difficult bit of technical exposition as clear and interesting as the subject permitted; and since "the home of lost causes" is not my *alma mater*, I may be permitted to acknowledge the value of Oxonian English in the literature of science.

My other example differs less than may appear at first sight. I have in mind an article describing mining conditions in a Central American republic. Such descriptions are usually made as verbally florid as the vegetation of the tropics and as involved as the jungle itself; at best, it is customary to bespatter them with unnecessary Spanish words and to deal in gorgeous generalities befitting the unlimited mineral resources of an inaccessible region. From these common faults this article was free. The sentences were short and to the point. The statements conveyed information without exaggeration.

The writer kept what he knew at first hand separate from what he had merely been told; he gave just the information for which the average intelligent reader would ask, and a touch of humor was not lacking in his references to the queer things that happen on a Central American frontier. It was like the sensible talk of an intelligent traveler who has kept his eyes open and his notebook handy. The writer had not received a special training in the language of his own country nor in that of another; as a graduate from a technical college in Michigan he had acquired rather more of contempt than of love for the use of proper words in proper places, and yet, by dint of native intelligence and the desire to do his task well—the true professional spirit—he had succeeded in preparing an article that in its way was as good as that of the Oxford man. Both men were unaffected, both kept in mind the purpose of their writing, and both knew what they were talking about. The moral is that bad writing is due to insincerity, carelessness, or ignorance.

I give you another instance. A young engineer of my acquaintance wrote fairly well because he liked to write; he had the desire to become adept, and I encouraged him. He had lived among the mines long enough to acquire the habit of using slang and other colloquialisms fatal to the literary quality of his writing; he would say that "Goldfield had staged a comeback" or that a mining company "contemplated the prosecution of an intensive campaign of development". Nevertheless he could write in an interesting way because he had the quality of natural directness. So I told him plainly that his mode of expression had suffered from adaptation to an illiterate environment and that to restore his English to health he ought daily to read a chapter from some first-rate author, such as Huxley, Ruskin, or Froude. He did so; the result, hastened by literary taste and native intelligence, was evident in a short time. He read the best books and studied the technique of writing concurrently, until he learned how to write an excellent article. He arrived! His experience should encourage others, although

not every young engineer will have the innate feeling for language that leads to proficiency under sympathetic training.

Natural directness is a characteristic of the best technical writing. Sumney says: "As a rule, style ought to be straightforward. Though interruptions and asides are often permissible, even necessary, they justify themselves only by helping the reader to understand as he proceeds".* Straightforwardness connotes the logical grouping of ideas. Stevenson said: "If a man can group his ideas, he is a good writer". The duty of a writer is so to arrange the words and phrases that express his ideas as to produce an utterance that is lucid because it is logical. This grouping or arranging—called 'syntax'—is the architecture of writing; it is the essential construction without which the ornamentation and decoration are futile. To erect a building one must have suitable materials, which must be used in accordance with engineering principles; to write something that is worthy, an author must be familiar with the words and phrases that express his ideas, and arrange his phrasing according to grammatical and rhetorical principles.

In describing a mining region or a metallurgical plant, "the writer should keep constantly in mind the fact that the primary object is to present to the reader a clear picture of the region [or the plant] described rather than to give an exposition of the mental processes by which his results have been obtained". So said S. F. Emmons many years ago when giving advice to authors of papers on economic geology. He said also that "a direct, simple statement of facts is more to be desired than rounded periods, rhetorical flourishes, or studied originality of expression". Be natural; be sincere; that is the best style.

In the matter of the relative pronouns, as in that of preposition-verbs and hyphens—indeed, in almost everything concerning which I have endeavored to instruct you—you will find example—even authority—to the contrary. Writing is a flexible instrument of expression, and the same thing can be said in several ways. The great art is to write in the way that

* Op. cit., p. 41.

makes the writing most easily understood by the reader—the particular reader or the class of readers for whom it is intended. In order to learn, we must, of course, look backward for precedents and for critical judgments, but we should also occasionally turn and look forward, and in that forward looking we should keep our eyes on the purpose of our work. Whether one great writer fail to distinguish between the relative pronouns or another use preposition-verbs like a German does not matter greatly unless it hinder us in writing clearly on technical subjects. Amid the distortions of English and the uncertainties of rhetorical doctrine we should not cry despairingly “Whither are we drifting?” Rather let us ask hopefully “Whither shall we steer?” The answer is prompt: “Out of fog, into the sunshine of clear plain English”.

Technical writing rarely conforms to the higher requirements of literature, largely because it is difficult to persuade technicians to conform to the lower requirements of plain scientific statement. George M. Wood, the editor of the U. S. Geological Survey's publications, confesses that “the purist or stylist would not be satisfied with the work done. The split infinitive may remain, unless it is very awkwardly split; the doubtful singular or plural may go unchallenged—whether three feet of sandstone *are* seen or *is* seen makes no difference to the editor so long as the verb is everywhere seen in the same number in the same paper; the restrictive ‘which’ that might be ‘that’ may go to print unless it conveys or suggests a wrong idea; ‘whose’ may be used for either persons or things without editorial protest, if not with commendation. Whether something ‘had better’ or ‘would better’ be done; whether work was ‘commenced’ or ‘begun’; whether the indicative should be used where a writer of the old school would prefer the subjunctive are questions that consume none of the time of the editors. Great latitude of expression and of style must be allowed, and the individuality of the author must be preserved—unless his individuality should consist principally in the repetition of faults of the kinds here described”.

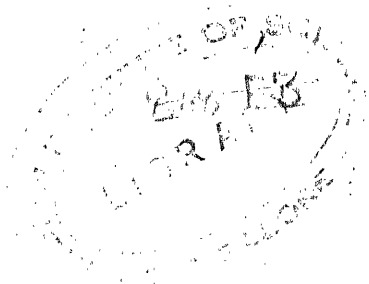
In the course of these lectures, I have quoted many examples of bad writing. You will have noticed that most of the faults criticized are due to carelessness rather than to ignorance. Thoughtlessness is fatal in matters that demand thought. Slovenly writing is the result of slovenly thinking, for "slovenly habits of expression corrode the very substance of thought".* It behooves us to remember that language in relation to ideas is a solvent, the purity and clearness of which affect the matter in solution. Whewell, in the 'Philosophy of the Inductive Sciences', has expressed this view with noble eloquence. "Language", he said, "is often called an instrument of thought, but it is also the nutriment of thought; or rather it is the atmosphere in which thought lives; a medium essential to the activity of our speculative powers, although invisible and imperceptible in its operation, and an element modifying, by its qualities and changes, the growth and complexion of the faculties which it feeds."

In considering this phase of the subject there comes to mind a suggestion that takes us far beyond the confines of the matter under discussion. Man's power of speech appears to divide him from all other living things; at the same time the imperfection of it weighs him down continually with the sense of an inevitable frailty. To be able to express oneself perfectly would be divine; to be unable to make oneself completely understood is human. In 'Man's Place in Nature' Huxley points out that the endowment of intelligible speech separates man from the brutes most nearly resembling him, the anthropoid apes, to whom he is otherwise akin in substance and in structure. This endowment of speech and the art of recording himself in writing enable man to transmit the experience that in other animals is lost with the individual life; they have enabled him to organize his knowledge and to hand it down to his descendants, first by word of mouth and then by written words. If the experience thus recorded were properly used, man's advancement in knowledge and in conduct would allow him to

* Allbutt.

emphasize, much more than at present, his superiority over the dumb animals. Considered thus, language is a factor in the evolution of the race and an instrument that works for ethical progress—it is a gift to be cherished as the ladder by which man has climbed from his bestial origin and by which he may ascend to a loftier destiny, in which, ceasing to stammer in accents that are but the halting expression of swift thought, he shall unfold his mind in the fullness of speech, and, neither withholding what he wants to say nor saying what he wants to withhold, shall be linked to his fellows by a perfect communion of ideas.

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